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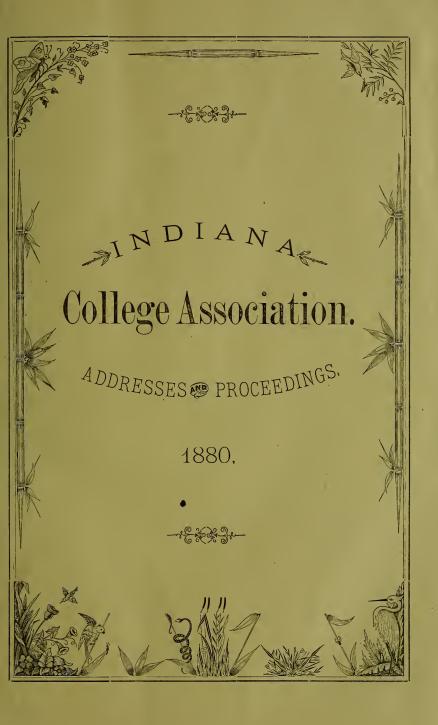
UNITED STATES OF AMERICA.













ADDRESSES

AND

OTHER PROCEEDINGS

OF THE

Indiana Follege Issociation.

26.0

THIRD ANNUAL SESSION.

Judianapolis, Dec. 27 and 28, 1880.

PUBLISHED BY THE ASSOCIATION.

ALEXANDER MARTIN, Com
JNO. M. COULTER,



CRAWFORDSVILLE: 1000.
REVIEW OFFICE BOOK AND JOB PRINTERS.
1881.

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HISTORY OF THE ASSOCIATION.

The membership of the Indiana State Teachers' Association has, since its organization, been composed of all classes of educators in the commonwealth. For many years it has been apparent that so far as the higher education is concerned, matters pertaining thereto cannot, for want of time, be fully and advantageously discussed in the general meeting of the Association. Accordingly, a College and High school section became, nominally at least, a part of the annual programme of the Association. But the pian was never more than partially successful; so that the educational work peculiar to the College continued to be but imperfectly considered.

At the State Association of 1877, held in Indianapolis, it occurred to several of the College men that the interests of the higher education would be better subserved, not by withdrawing from the State Teachers' Association, nor by abating any interest therein, nor by attempting in any measure to direct the current of work in it from its natural tendency towards the common schools, but as a supplementary measure, and for the necessary purpose of securing a fuller and better discussion of College instruction and management, by organizing a separate Association. Accordingly a call for a meeting of College instructors was issued, and twenty-four representatives from the higher institutions met on Thursday, December 27th, 1877, during the session of the general Association.

The house was called to order by President Lemuel Moss, of Indiana University, who moved that President Alexander Martin, of the Indiana Asbury University, be called to the chair. The motion was adopted. Professor Amzi Atwater, of Indiana University, was, on motion, chosen temporary Secretary. The object of the meeting was stated and the subject discussed by Presidents E. E. White, of Purdue University, Lemuel Moss, of the Indiana University, George C. Heckman, of Hanover College, Joseph Moore, of Earlham College, Joseph F. Tuttle, of Wabash College, and by Professors A. R. Benton, of Butler University, G. W. Hoss, of the Indiana University, Colonel H. B. Carrington, of Wabash College, J. C. Ridpath and J. E. Earp, of the Indiana Asbury University.

A committee consisting of the presidents of the Colleges represented, or, in the absence of the presidents, the senior professors in the same, was appointed to consider the subject and report at a meeting to be held the following morning at nine o'clock. The meeting then adjourned.

'On Friday morning the adjourned meeting was called to order by President Martin, the temporary chairman. The report of the committee on organization, consisting of a constitution and by-laws, was read by President Martin, seriotim, and after due consideration and amendment, adopted. The Association proceeded to the election of officers, and the following were elected: President, Dr. Joseph F. Tuttle; Vice-President, Dr. G. W. Hoss; Secretary, Prof. J. C. Ridpath; Treasurer, Dr. A. R. Benton. The meeting then adjourned.

Such, in brief, is the origin of the Indiana College Association.

CONSTITUTION OF THE ASSOCIATION.

ARTICLE I.

This Organization shall be called The Indiana College Association. ARTICLE II.

The Presidents and Professors of the Colleges represented in this organization shall be entitled to become members of the Association.

ARTICLE III.

The objects of the Association shall be the mutual improvement of its members and the consideration of college instruction and management.

ARTICLE IV.

The officers of the Association shall be a President, a Vice-President, a Treasurer and a Secretary; and their duties shall be those usually pertaining to such officers. Said officers shall be elected by ballot at the close of each annual session, and shall hold office until their successors are chosen.

ARTICLE V.

The retiring President shall, at the first meeting of each annual session, read an address prepared by him on such subject as he may deem appropriate to the objects of the Association.

ARTICLE VI.

Members of any College Faculty, other than those here represented, may be admitted to membership in the Association by a two-thirds majority vote, which vote shall be by ballot.

ARTICLE VII.

Members on joining the Association shall pay one dollar each to the Treasurer, and fifty cents annually thereafter.

ARTICLE VIII.

The officers, for the time being, shall constitute a Standing Committee whose duty it shall be to prepare the annual programme, select the speakers and procure a suitable hall for the sessions of the Association.

ARTICLE IX.

The annual session of the Association shall be held at the place of, and on the day preceding the meeting of the State Teachers' Association, unless otherwise ordered by the Standing Committee.

ARTICLE X.

This constitution may be altered or amended at any annual session of the Association by a three-fourths vote of the members present.

BY-LAWS.

All regular addresses before the Association shall be limited to thirty minutes.

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All discussions, other than those designated by programme, shall be limited to ten minutes.

III

There shall be appointed at each session of the Association a committee of three, who shall have charge of all publications authorized by the body, and report their work to the Association.

INDEX OF MEMBERS AND COLLEGES,*

INDIANA UNIVERSITY.

LEMUEL Moss, President and Professor of Mental, Moral and Political Philosophy.

AMZI ATWATER, Professor of the Latin Language and Literature.

- G. W. Hoss, Professor of English Language and Literature, and Elocution.
- O. B. Clark, Professor of Greek.

W. R. Houghton, Principal Academic Department.

HANOVER COLLEGE.

D. W. Fisher, President and Professor of Ethics and Biblical Instruction A. H. Young, Professor of Natural Science.

WABASH COLLEGE.

JOSEPH F. TUTTLE, President and Professor of Moral and Intellectual Philosophy.

JOHN L. CAMPBELL, Professor of Physics and Astronomy.

HENRY R. THOMSON, Professor of Chemistry.

JACOB NORRIS, Professor of Mathematics.

JOHN M. COULTER, Professor of Natural History.

INDIANA ASBURY UNIVERSITY.

ALEXANDER MARTIN, President and Professor of Mental and Moral Science.

PHILANDER WILEY, Professor of the Greek Language and Literature.

JOHN C. RIDPATH, Professor of Belles-Lettres and History.

John E. Earp, Professor of Modern Languages and Hebrew.

T. J. Bassett, Instructor in Ancient Languages.

P. S. Baker, Instructor in Natural Science and English.

J. M. Mansfield, Professor of Natural Science.

JOHN B. DEMOTTE, Principal Preparatory Department.

FRANKLIN COLLEGE.

W. T. Stott, President and Professor of Mental and Moral Philosophy.

J. W. Moncrief, Professor of Greek Language and Literature.

C. H. Hall, Professor of Latin Language and Literature.

BUTLER UNIVERSITY.

O. A. Burgess, President.

A. R. Benton, Professor of Mental and Moral Science, and Greek.

CATHARINE MERRILL, Professor of English Language and Literature. Scot Butler, Professor of Latin Language and Literature.

MOORE'S HILL COLLEGE.

O. P. Jenkins, Professor of Natural Science.

EARLHAM COLLEGE.

JOSEPH MOORE, President and Professor of Metaphysics and Ethics.

W. A. MOORE, Professor of Mathematics.

A. McTaggart, Professor of Latin.

CALVIN W. PEARSON, Professor of German, French and History.

STATE NORMAL SCHOOL.

S. S. Parr, Instructor in Psychology and Drawing.

PURDUE UNIVERSITY.

- E. E. WHITE, President and Professor of English Literature.
- C. R. Barnes, Professor of Natural History.

UNION CHRISTIAN COLLEGE.

J. C. Smith, President and Professor of Mental and Moral Science.

BEDFORD COLLEGE.

- J. A. Beattie, President and Professor of Mental, Moral and Political Philosophy.
 - W. B. Chrisler, Professor of Mathematics and Natural Science.

CENTRAL COLLEGE OF PHYSICIANS AND SURGEONS.

Charles D. Pearson, President and Professor of Obstetrics.

A. W. Brayton, Professor of Chemistry, etc.

IRA A. E. LYONS, Professor of Opthalmology, etc.

W. W. BUTTERFIELD, Professor of Human and Comparative Histology.

G. C. SMYTHE, Professor of Practice of Medicine.

HARTSVILLE UNIVERSITY.

C. H. Kiracofe, President and Professor of Mental and Moral Science.

^{*}Colleges arranged in the order of establishment.

PROCEEDINGS AND ADDRESSES.

THIRD ANNUAL SESSION.

DECEMBER 27, 28, 1880.

The Third Annual Session of the Indiana College Association convened, according to announcement of Executive Committee, in Central Christian Chapel, Indianapolis, at 7:30 P. M., December 27, 1880.

The house was called to order by the President, Dr. A. R. Benton, of Butler University.

The exercises were opened with prayer by President D. W. Fisher, of Hanover College.

The Association was favored with a vocal duet by Mrs. J. C. New ane Prof. Ora Pearson.

The minutes of the last meeting were read and approved. A vocal solo was rendered by Mrs. J. C. New.

The President's address on the subject of "Liberal Education" was then delivered by Dr. A. R. Benton, of Butler University.

LIBERAL EDUCATION.

DR. A. R. BENTON.

This, the third annual meeting of the Indiana College Association, is held in the interest of the Higher Education. We meet to discuss the various phases of College work, to stimulate thought, and to impart from individual experience what may serve as guidance and inspiration to others.

Education is a word of large suggestion. In its amplitude of

meaning, it embraces the training and perfection of the human mind, and the search for, and acquisition of all truth. Nor is this evolution of human capabilities and acquirement shut up to a narrow limit of time, but presumptively it stretches out into the infinite and eternal. Hence it has a perennial freshness and interest. Like the immense cairns, or mounds of stone, upon which every passer-by is said to have a passionate desire to cast his contribution of a stone, so the literature of education has grown to vast proportions, and its bulk is constantly enlarged by the acuteness of speculative minds and the experience of instructors. No educational man can be found who has not wrestled with this question, and who has not attained decided convictions respecting education, domestic and public, in the common school and in the College, general and technical.

In all the contrariety of opinion that prevails on this matter, there is one thing at least in which all are agreed. It is, that true education helps to make a man or woman more of a man or woman; that its ultimate end is the perfection of the human intelligence and of human character. This teleological purpose implies some system of higher or liberal education as the necessary complement to the elementary instruction and discipline of common and intermediate schools.

As appropriate therefore to this presence and this occasion, I propose to set before you some views on this branch of the educational question. What is the nature, what the conditions and means of a liberal education in our time, and with our educational appliances? It might be a fascinating employment to attempt the construction of the ideal and perfect system, such as will, perhaps, be in vogue, and will charm aspiring youth in the millenial age. But our conditions are inexorable, and we shall consider with more profit what is practicable and possible for us.

It is not easy to give with exactness a definition of the term "Liberal Education." It is an expression of an idea somewhat vague and undetermined. It is often used in a generic sense, to include a course of study which entitles a student completing it, to the degree of Bachelor of Arts, at the hands of a College authorized to grant such a degree. In this statement, nothing is implied with respect to any standard, fixing the quality of the instruction given, its variety or its adaptation. It is a question of quantity—so much work, so much

time, and the degree, as an attestation of a liberal education, is granted. This resembles the treatment of some fevers. When the medicine in quantity has been taken according to formula, and the fever has run its course, the patient is discharged and pronounced whole, as the liberally educated man is supposed to be, "totus, teres, et rotundus." Considered objectively, the word "liberal," as applied to the number of studies in our College courses, is no misnomer. The number is eminently liberal and exhaustive.

But to come nearer to the real meaning of our theme. A liberal education, I take it, is one that realizes the true ends of all education. These are, first, the fullest and freest use of every faculty of the soul; and, secondly, the potential mastery over all forms of knowledge—the power and capacity to appropriate all that is extant and healthful, in the realms of knowledge and of culture. It is, in a word, "to know something of everything, and to know everything of something." Says Sir Wm. Hamilton: "The paramount end of liberal education is the development of the student's mind." This gained, all else follows. To this clarified eye of the mind, the universe becomes transparent and glorified.

It may be inquired, whether by liberal education, we mean something invariable and absolute in its character. In all education, of whatever grade, there are two factors, one variable, the other invariable. The constitution of the human mind, the nature and validity of knowledge are invariable; the changing conditions of social and political life, and the growth of knowledge from age to age, constitute the variable element. The subjective conditions always remain the same; the objective means and appliances are constantly undergoing a change. Hitherto, it has often happened that one of these factors in education has been exalted at the expense of the other. Instead of coordinating these two grand facts into a harmonious system, partisan theorists have strenuously maintained the value of one, and decried the other. A true synthesis of the faculties of the mind and of all forms of knowledge is essential to the philosophy of education, we call "liberal." As there are schools in medicine, sects in religion, parties and factions in politics, so we have contending systems in education. The new education is elbowing the old, the disciplinary is pitted against the practical, and scientific education is contesting the supremacy with the old regime of classical training. The higher education waits for a broad philosophy, and patient experiment to determine what is the best possible for our conditions and our time. trend of thought in our age seems to be in the direction of the Platonic theory, that Higher Education should be by the state and primarily for the state. The form in which the matter is put before us is: What education is of most worth? What specialized form will make one most effective in the world of affairs? These inquiries have a sordid, mercenary ring about them, too often alluring and betraying the inexperienced. Whatever may be the value of specialized or technical education - and their value I do not call in question - they cannot be called liberal, and I may go further and say that they are essentially and practically inferior to it. Formerly, what was called the "learned professions" implied liberal education; but to-day almost the reverse is implied. It is a violent presumption, that the great majority of those in the so-called "learned professions" have anything more than the elements of an education, and that, too, generally an English education. Henceforward we must speak of these professions as specialized forms of education, fitting the recipient for some service to society and much service to himself. The reputation of belonging to one of the "learned professions" - a phrase which has a slight sarcasm in it—has a certain marketable value, which is quite disproportionate to the mental culture that was formerly implied. the large number in these professions, comparatively few have gained the degree of Bachelor of Arts in any College; and their degree of M. D., or LL. B., stands for far less culture and mental growth, on the average, than the A. B. of even a Western College. It certainly must be altogether conventional to call professions "learned" whose specialized course of instruction can be given in two terms of six months each. Age and character are the chief requisites for admission to such instruction, and if literary requirements are made, they are of a meager sort in every respect. I speak thus of facts published and known to all men, not in a narrow or controversial spirit, but to set forth with whatever clearness I may, that such specialized education is not liberal education. Whatever may be urged in apology or commendation for such special instruction, on the grounds of public needs, and of supplying a want in our transition stage of education, it certainly is best to know things as they are, rather than, as the Hibernian would say, "to know so many things that are not so."

The breadth, vigor and wholesomeness that belong to a truly lib-

eral education are entirely unknown to the system, which initiates the majority into modern professional life.

To no class, more than to College men, belongs the duty of correcting the vague and damaging notions that prevail on this matter; and to point out the comparative fruitlessness of such a partial education; and to hold up a system of such ideal and practical value as will realize the greatest good to the individual and to the commonwealth.

It is a fact, patent to all intelligent observers, that during the last fifty years there have been insurgent attempts to modify greatly, or to change completely the curricula of study formerly deemed to be essential to liberal education. Journals of all sorts, secular, religious and educational, have here found a free field, hot contestants, and a weary, unsettled strife. If there is a lull in the battle along the whole line, it suggests the exhaustion of the combatants, rather than the peace of victory. This has been our period of theorizing and experimenting, and we have learned one lesson, at least, by our Socratic questionings, that much "that we knew has contradicted itself," or, in other words, that the aims and methods of former times are untenable in the forum of a true psychology or a sound philosophy. modern time," in the words, of Carlyle, "has had little reverence for the majesty of custom." Blows, sturdy and violent, have been delivered by eminent Englishmen against the shortcomings of Oxford and Cambridge. These have been felt along the whole line of educational reform in this country. In all this conflict of opinion and conflict of studies, there has been progress; and from them an evolution of much that will stand the test, when rationally or practically considered. To use one of Bacon's fine phrases, "We have been using Argus' hundred eyes, before raising one of Briareus' hundred hands." Patiently and thoughtfully our Colleges and Universities have been feeling their way, receptive to new methods and new studies, that might give scope and inspiration to their work. The controversy once so rife between the conservatives and educational reformers is fast becoming a tradition; and the relative value of literary and scientific training in liberal education no longer excites controversial heat. This adjustment of rival claims of the various branches of human knowledge in our system of Higher Education is practically complete; for it is based on a true psychology and a sound philosophy of the end and purpose of all education. The Higher Institutions of

learning, whether East or West, by their various courses of study, and their system of elective studies, have so multiplied opportunities, that even the most captious objector finds his occupation gone. The reproach, once so freely indulged in, against Colleges, on the ground that they were unprogressive, blind followers of precedent, teaching everything a man did not need to know, if ever true, has no longer any pertinence. Our danger lies in incurring reproach, on account of a scheme of study too broad for four years, and hence often incomplete in execution. Of this, however, in another place.

We have already stated that reform in liberal education has been effected by the application of the principles of a true psychology, and a sound philosophy. These alone can determine the ends and methods of education. It is important, therefore, for teachers in the department of liberal education to become familiar with the principles that underlie their work. Mind, the fundamental fact in all education, should be made a subject of earnest, absorbing study, for its powers, capacities and possibilities must guide in the selection of material and method of its liberal culture. Our purpose is not one of analysis, in order to show the constitution of the mind and the scope of its faculties. We only wish to emphasise the thought, that a knowledge of mind is transcendent in value to the educator. grasp the philosophy and processes of liberalizing this complex and God-like nature, which we call mind, is in itself a liberal education. It calls for the highest order of thought. Such thinkers as Mill, Froude, Carlyle, Bain and Spencer, in England, and all college presidents and many publicists in our country have given it profound thought and large discussion. By such means have our educational reforms been effected. These reformers have not been an invading army, only intent on overrunning a country, but an army of occupation, holding their conquests by fortresses, and permanent entrenchments. There is a sentimental materialism abroad in the land that would narrow the scope of liberal education. Man, in his nature, his works, his history, literatures and arts, and Nature, in her manifoldness, as displayed in the sciences, as marvelous in number, as they are wonderful in their subtle complexity, seems to some to be a field too broad for culture. Thus we find Mr. Froude leaving his literary portraiture of the Elizabethan age and journeying to Scotland in order to commend "Hand-work before Head-work," and in a sense to disparage the studies and pursuits which alone will snatch his

name from oblivion. For himself, this distinguished historian and man of liberal learning, is not content with only so much of training and knowledge, as will fit him for the world of affairs. Like our greatest naturalist, and the brightest ornament of science in America, the late Prof. Agassiz, Mr. Froude cannot afford to get rich. And yet he lends the influence of his great name to the doctrine of Cobbett, that it is more important for Englishmen to eat bacon, than to read Bacon. Physical well-being is not the be all, or end all, of human existence.

When Napoleon uttered his spiteful sarcasm against the British people, that they were a nation of shopkeepers, he learned soon to his cost that his contest with that famous land, was not with shopkeepers, but with men deeply versed in liberal learning, yet mighty in the world's affairs. Lord Wellington, when visiting one of England's great public schools, is quoted as saying, "the battles of England are fought and won here" of which his own career was an illustrious example. The shop, the market, the field, all important in their place, are not the chief end or purpose of man. The proposition, which asserts, no people can ever become great or powerful without a large, liberally educated class, affirms a demonstrable truth. So thought Stein, Niebuhr, Humboldt and others when they laid the foundation of the University of Berlin, designed to be, as it afterward proved, a mighty instrument in lifting Prussia from her state of degradation and dishonor.

Socrates with his wisdom and penury is to the world a more edifying and inspiring example, than his rival Gorgias of Leontinum, rolling in the luxuries of superfluous wealth. Liberal education is the prime factor in individual culture and national greatness

The conditions of liberal education are also to be taken into account. These are chiefly, varying age; the successive development of the mind's faculties; the adapting of knowledge to the development, and increasing capacity of the mind; and the native bias of the mind to this or that. These conditions sweep through all grades of study. In a sense, true primary education is liberal, for it is a link in the chain of causes, that brings the mind to its perfection. Hence college instructors have a vital interest in the nature and quality of the education received in its primary stages. The mind in youth is the same as in maturity. The germs of all faculties are in the infant even, waiting for the genial influences of culture to give

them strength and perfection. Now, whatever belongs to the Higher Education must be anticipated in the primary stages of instruction. Every power of the soul should be awakened, and all forms of knowledge, essential to this end, should be laid under tribute. gives a true synthesis of man and nature, and placates the old contention between rival systems. The reaction against the unnatural and premature method of beginning with abstractions, in the matter of education, has greatly fostered a too exclusive culture of what is experimental and verifiable in knowledge. In the coordination of studies, constituting a truly liberal education, ethical studies in which man and his works are treated will be found to be an essential condition. In dignity and importance nothing in liberal learning outranks them. Man in his language, history, philosophy, politics, poetry and other fine arts, must essentially condition all learning, as well as Nature does in her manifold systems, that have received scientific handling.

Again, in liberal education Method is no inconsiderable factor. The pressing question among college instuctors of our time, is, not so much what to teach as how to teach. The practice of our best teachers is much below the inculcations of the best thinkers on educa-It is an infelicity of our work, that it is hard to realize even our own ideal. A change of studies, for which the New Education clamors, to the exclusion of those which have been approved by the suffrages of educators, is no remedy for bad methods. The gerundgrinder, as the teacher of ancient languages is facetiously called, is not a whit less faulty in method, than he who teaches the English language, or one who drones through a text-book of hard, technical names, with a bewildering cumulation of insignificant, and uninteresting details. "The pettiness of pedantic specialism" is the bane of teaching and the death of all inspiration and contagious enthusiasm. This defect is not peculiar to our times. Two hundred years ago John Locke wrote, in the spirit of sharp criticism, words that have an amazing fitness and pertinence in our day. Says he, "If any one among us has a felicity or purity more than ordinary in his mother tongue, it is owing to chance or genius, or anything, rather than to his education or any care of his teacher." I have no wish to stay the hand of any educational reformer who wishes to hew to pieces this modern Agag of false method in teaching. But let this avenging zeal be impartial, and according to knowledge. If the abuse of

method is hoary with age, let it claim some of the privileges of honorable age; but smite with the hammer of the iconoclast every false image, set up for homage in the name of the new education. may be allowed a certain freedom of utterance, and without offence, I opine, that the chief defect in method is personal. The reliance which modern method places on the machinery and appliances of instruction is quite disproportioned to their merit. The personality of the teacher is retired, the method stands in the foreground. It is one thing for a teacher to master the machinery of method; it is quite another to master that for which all method exists—the mind and heart of the student, and the approaches to them. It occurs to me, that the chief word in the method of liberal education is inspiration. From the time of Socrates to that of Dr. Arnold of Rugby this has been the "primum mobile." A learned Englishman, in the Contemporary Review for March, 1878, has pertinently inquired, "In what does the gift of teaching consist? Assuredly not in the possession of a large body of solid learning. It consists infinitely more in the power of sympathy, the ability to place oneself in the exact position of the learner, to see things as he sees them, and to feel difficulties as he feels them, and to be able to present the solution precisely in the form that will open the understanding of the pupil, and enable him in gathering the new piece of knowledge to comprehend its nature and value." This method stands out in sharp contrast with what may be called the impersonal method. This latter sends the student out to browse in the field of knowledge, and from time to time examines his intellectual growth, and marks it on the intellectual scale with scrupulous exactness and pretentious significance. The student is left largely to himself, to organize painfully, and to correlate imperfectly the various facts and principles of his research into such unity as science or philosophy demands. Or, forgetting that "the subtilty of nature is forever beyond the subtilty of man," impersonal teaching often requires some marvelous feat of memory in which an infinity of detail, dry as the clown's "remainder biscuit after a voyage," is made the test of knowledge and culture. There is much in a liberal education that cannot be learned well and orderly from books alone. Many subjects need the vivifying, directing mind of the teacher. This needs to be active, comprehensive and judicial. The personal element must so handle both the matter and manner of teaching as to compel confidence. In the matter, the teacher should be a trusty

guide through the mazes of hypothesis and speculation, moderating the intoxication begotten of new and surprising glimpses of knowledge, and conducting, as a faithful Mentor, the learner through all difficulties, into the safe moorage of truth, verified by experiment or established by a sound philosophy. Such an one will discard the speculating, romancing style of teaching, which catches at half truths, having, perhaps, a nebulous grandeur, exciting wonder, rather than imparting exact information. This question of the matter, which shall enter into liberal education, has been distinctly raised in Germany in the well-known controversy between Professors Virchow and Haeckel. In the highest reaches of thought belonging to history, ethics and biology, and kindred subjects, the personal power, and, in some sense, the authoritative and discriminating indgment of the living teacher is indispensable. In former times, the living teacher was a necessity, because of the scarcity and costliness of books. the present, books are spawned with the fecundity of Egyptian frogs, sometimes as disgusting and pernicious, making the function of the teacher no less important and vastly more varied and complex. The instinct of every well constituted mind impels the learner to reconcile contrarieties and to explain paradoxes, so as to reduce all his knowledge to a seemingly consistent and concordant system. The mind strives to organize its knowledge, so that it may be scientific in fact, as well as in form. In this respect the office of a wise, comprehensive, judicious instructor is of great moment.

No one would say that the late John Stuart Mill was not a liberally educated man. But who would venture to maintain, after reading his sad, and saddening autobiography, that the proper conditions of growth and development of his intellectual and moral life were observed; or that an instructor of intellectual vigor and contagious sympathies might not have saved him from the narrowness that is begotten of isolation and of the adulations of a few admirers.

And lastly, we have to consider the grave and embarrassing question, what are the studies by which this education can best be realized? This question will stand before us in its magnitude when we consider the changes, that have taken place in subjects of study, in the last hundred years. Guizot, in one of his admirable analytical essays, depicts the astonishment of a burgher of the free cities of mediaeval times, on his supposed return to earth in the middle of the Eighteenth Century. Everything is new and changed; and to him, as to Rip Van Winkle who

expected to find in his home his accustomed joys and companions, all is bewildering confusion, and inexplicable mystery. Could Roger Ascham, Roger Bacon, or John Milton, after the lapse of more than two centuries visit our seats of learning, especially in inventive progressive America, what would be their astonishment and bewilder ment. In their time Greek Latin and Mathematics were the studies from which their liberal education was derived. In addition to these, our visitants would find in the Modern College about twenty-five studies more which are now regarded as essential in a liberal course of study. No doubt they would look upon the modern plan with unmitigated contempt; and at first blush there is much to be said against it. In their incredulity and contempt for this loading down the college course with all conceiveable subjects, many modern thinkers and scholars have fully sympathized. Among these Mr. Froude stands conspicuous, who after venting his indignation upon the Oxford system of teaching, turns with fury on the modern system of attempting to teach everything. Listen a moment to his furious assault upon the modern system. "If I go into modern model schools, I find first of all the three Rs. about which we are all agreed. I find next the old Latin and Greek, which the schools keep to, because the Universities confine their honors to these; and then by way of keeping up with the times "abridgements," 'text-books, 'elements, or whatever they are called of a mixed multitude of matters, history, physiology, chronology, geology, political economy, and I know not what besides—general knowledge, which is my experience means general ignorance, stuff arranged admirably for one purpose, and for one purpose only—to make a show in examinations." These words seem to be the passionate invective of a heated controversialist, rather than of calm, judi cial inquiry. Edward Everett in his inaugural address as President of Harvard College decisively pronounces against this accumulation of studies. "The student," says he, "is taken over more ground in a short time than he is able thoroughly to explore. These difficulties are usually serious, and among those with which it is the hardest to deal."

President Wayland of Brown University, in treating the same topic, is more direct and pungent in his criticism. "Can the work that is marked out in the course of studies in any of our Colleges be performed in four years?" he inquires. "Is there any proportion between the labor to be done, and the time in which it is to be accomplished? The course of study in the English Universities is extremely limited; the students enter the University from the best grammar schools, and yet those who are candidates for honors are obliged to study industriously and frequently intensely. If this be a fair measure of what a student can do, what must be the result if three or four times the amount of labor be imposed on him? It must be evident that he cannot do it well." And to sum up the statement of the case in the words of Sir Wm. Hamilton, "Every writer on academical education from every corner of Europe proclaims the abuse."

In the wide range of studies, some disciplinary, some practical, and some aesthetical, it has been no easy task to fix on a principle of selection of studies, that ought to enter into our system of liberal education. In America, owing to the absence of governmental regulations requiring high intellectual culture in order to enter the public service, our Colleges have enjoyed great freedom in adjusting their courses of study, and in breaking down the old traditional method.

In my opinion, there are two fundamental ideas that must control the arrangements of our College courses of study. These alone can save us from the reproach of attempting to do everything and of doing nothing well.

The first principle that should guide in the selection of studies from the great number that clamor for recognition is, that such studies alone shall be chosen which unfold and illustrate general laws. Hence, for example, Astronomy need not be taught with a view of making Keplers and Herschels, but only that body of facts and principles, which when known will give an intelligent appreciation of the scope and grandeur of this science. This course need not, and ought not to tend to vague and superficial instruction and impressions, but must be severely logical and comprehensive. Such a principle of selection and such a method of application will liberalize the mind of a student, while it leaves all the minor details, belonging to the interstices of knowledge, to the study of the specialist, or the research of the Professor.

The elements of knowledge if derived from the analytical point of view will always have logical coherence and completeness, because seen in their relations to the whole; and those sciences will be best adapted to the ends of liberal education, which like a great Epic, have a grand theme and a completed unity. This principle, if valid, has important suggestions for the teacher.

The second cardinal principle is, that the tastes and capacities of students must be taken largely into account. Such are the predispositions and aptitudes of students, that compelled into some studies, their time is worse than wasted. Unless we are prepared to discourage the aspirations of many young persons for a liberal education, an adjustment from the great mass of studies must be made, so as to fit the needs of all.

The Procrustean system of bringing all to the same standard of measure has neither experience nor philosophy to commend it. If the philosophy of the unconditioned is incomprehensible to some student, he may nevertheless be a genius in mathematics and their application. If a student has no ear for music, better not compel him to learn to play that noble instrument, the bass viol.

One of the infelicities of a Professor's lot is, that he is often compelled to interest and instruct students in studies for which no basis of interest has been laid in their natures. Invincible distaste for, and repugnance to some studies, and native incapacity for them, are stubborn facts, with which a Professor has often to deal. The old method of one inflexible course for all sorts of minds, had the merit of simplicity. It had also the quality of inapplicability painfully prominent. The remedy for the evils that inhere in the old Procrustean system is found in the modern device of elective courses of study, and in elective studies, with their appropriate degree. The tardy recognition of diverse capacities and inborn aptitudes of students has led the way to such elections, and furthermore, in them we find a safe escape from the embarrassments of overcrowded courses of study. In the use of such a flexible system, much of the distaste and repugnance of students is also overcome, and the Professor is relieved of the laggards and hopelessly incompetent. And may it not also happen, that with the better work done under such a system, the degree of A. B. will regain much of its former significance and value. But let us not mis take. The choice we indicate is not, that the student chooses between liberal and disciplinary studies, and such as are professional. All the studies required for a degree are liberal, prosecuted through four years, aiming at a high grade and range of education. Administrative difficulties may arise in carrying out a broad scheme of elective studies, where the number of Professors is not large; but an earnest effort by even a few accomplished teachers can effect much. I do not venture on the questions, where such election should begin in the College course, or how wide a choice should be offered. These are questions relative to each College, and must be judged from the conditions surrounding each. Whatever we may do or may not do in this matter, or if we fail in it, the remark of a celebrated chemist, when he failed in an interesting experiment before his class, is applicable; "Gentlemen the experiment has failed, but the principle remains the same."

It has been our purpose to set forth the nature of a true liberal education, as training all the powers of the mind, and in giving it sovreignty over all matters that are knowable. We have also adverted to the conditions that environ the subject, and which indicate the true method by which its distinctive ends may be realized. And finally we have glanced at the great embarrassment of College work, found in the multiplication of studies, that overload our courses that lead to a degree, and which tend to superficial instruction and unsatisfactory attainments.

And in closing allow me to suggest, that in all our plans for liberal education of students, we should keep before our minds and theirs the real ends of all academic discipline. What is the fruit of a liberal education? It is not to prize, or to rest in the husks or forms of knowledge, but to realize its connections with the vital issues of life, with high living as well as high thinking. With such College discipline the mind becomes open and receptive; the methods of investigation are philosophic and certain; and in a broad and comprehensive manner, the accumulated thought of past ages, in the words of Thu cydides, becomes $\varkappa \tau \tilde{\gamma} \mu \alpha \approx \zeta \hat{\alpha} \epsilon \ell$. - a possession forever.

A committee, consisting of President Moss, Prof. J. M. Coulter and Dr. J. E. Earp, was appointed to nominate officers for the ensuing year.

A committee, consisting of the incoming President and Secretary, was appointed to superintend the publications of the Association for the year 1881.

A committee, consisting of President Fisher, President Moss and Dr. McTaggart, was appointed to report to the Association on the question of extension of membership.

A committee, consisting of Dr. J. C. Ridpath and Prof. J. M. Coulter, was appointed to report to the Association a suitable place for the next annual meeting.

The Association then adjourned to meet at 9 A. M., December 28.

SECOND DAY'S SESSION.

The Association was called to order, pursuant to adjournment, by the President, Dr. A. R. Benton.

Prayer was offered by Dr. J. E. Earp, of Asbury University.

The committee on extension of membership reported through their chairman as follows:

- I. That no change be made as to regular membership in the Association.
- II. We recommend that the constitution be so construed as to make it lawful at each meeting of the Association to admit to participation in the discussions such distinguished educators as may be present, provided that such admission shall in each case be determined by a ballot of the members present, and that it shall be earried by a majority of the votes east.

The report was adopted and under its provisions Prof. J. B. Roberts, of the Indianapolis High School, and Prof. T. L. Sewall, of the Indianapolis Classical School, were admitted.

Prof. John M. Coulter, of Wabash College, then read the first regular paper of the day on the subject of

SCIENCE IN OUR COLLEGES. PROFESSOR JOHN M. COULTER.

When asked to address this Association upon some Scientific Theme, I did not suppose that an address was asked for, such as would be appropriately delivered before some Scientific Association, for that would be an imposition upon the great majority of this audience, and nothing is more trying to speaker or hearer than a subject interesting and really intelligible only to the former. For this reason I have selected a subject that can form a common meeting ground. We are all teachers, all interested in bettering our courses

of study. I am not entirely satisfied with the present arrangement of things and know of no place more suitable than this in which I can give expression to some of my thoughts upon the very general subject of "Science in our Colleges."

It is not so much my intention to speak of the importance of the Natural Sciences in our Colleges, as to provoke some discussion upon a subject that has been prominent for some time in my own thoughts, and becoming more and more prominent in its demands upon the attention of all College Faculties. Views upon this subject are very apt to run to one extreme or the other. We are either told that Natural Sciences deserve but a passing notice in our course of study: that the training must come from Greek, Latin and Mathematics; or that they should occupy the most prominent place, and that Greek and Latin should be taken, if at all, in the smallest possible doses, that they are dead things and as such should be buried out of our sight. There are fanatical teachers in every department, fanatical teachers of the Classics and fanatical teachers of Science, and it would be a most unfortunate thing if we were compelled to follow the guid ance of either. In either case we would run into ruts so deep that our work would narrow, rather than broaden the minds committed to our training. It will be noticed that the path I choose to tread in this paper lies fairly midway between these two extremes. It is not my intention to bring up any controversy between upholders of classical and scientific studies, for I can find no ground for contention. As an earnest lover of Greek and Latin, convinced of their very great importance in any scheme of study, I would deprecate any attempt to decry them or to deny them a large place. My first position is rather prefatory to what I shall say later. It may seem to antagonize some subsequent statements, but not necessarily.

We must banish from our Colleges any idea that they are special schools in any department. This may sound strange coming from one whose department is the one generally accused of such transgression, but I think our curricula will bear me out in the statement that there is more special, technical study called for in several other departments than in what we generally include under the name of Natural Science. Of course a man must be a specialist before he is fit to teach in any department, but it does not follow that he must make specialists of all put under his care. The chief object of a College education should be kept in view, and that is a development of the mental powers in

every possible direction, and I conceive the latter clause states as important an element as the former. Untrained minds are submitted to our training and the effort should not be to run this plastic material into one or two narrow channels, but to let it spread over the whole broad flood-plain of thought. You and I well know that the result of our best efforts is not actual attainment so much as the ability to attain; that the facts we present and the technicalities incident to their presentation are not given so much for their own sake as for their influence in starting new trains of thought, in developing strength in untried directions. Do not think that at this late day I advocate putting all grist between the same stones, or imagine that Colleges are machines into which all shapes can be dumped and but one pattern emerge.

The old round of Greek, Latin, Mathematics, Mental Philosophy, Butler's Analogy and the like, is decidedly unsatisfactory, not because they are of no value in training or because they are not practical, but because they do not represent by any means all directions of thought, do not call into activity all the powers of the mind. This hardly needs any illustration, for it is well known to all teachers of Natural History that a young man in College, who has never studied anything in this department, is completely bewildered. Modes of expression and habits of thought are so entirely different from anything in his previous experience that he makes at first but bungling work. For this very reason graduates of a generation ago, when nearly all Natural Science was taught by some one Professor, who, too often, taught this because he was not fit to teach anything else, find it almost impossible to get hold of these new sciences, or to understand in any way their methods of work and reasoning. Of course, I would except many College Professors, for their studious habits have secured them, if not an actual, at least a possible development in any direction. There is a great demand now for practical studies and of course we must yield more or less to the desires of patons and furnish what they consider the practical, although we ourselves know that one study in College is about as practical as another and that none are practical in the sense our patrons suppose. I cannot make a practical geologist or biologist. best I can hope to do is to cultivate a taste for such studies that may eventually lead my pupil to becoming a practical geologist or biologist. No world's work can be done by the College graduate simply because he is a College graduate, unless it may be teaching a common school, and even then he is learning how to teach. Of course we must have

different courses of study to suit the varied tastes of these mental epicures who come to us; but every course should have the same end in view, namely, strength and uniform development. Do not put the sweet meats in one course and solids in another, but let there be in every course such a mingling of both that the result in every case will be the same, viz; a cultivated intellect, broad in its views, ready now to choose some specialty. All professions are lumbered up with those who know nothing else. A scientific man who knows, or cares to know nothing but science, is usually a great bore, if not a bear, and we are sick to death of these scientific ignoramuses whose mental horizon is bounded by a few cant phrases and who are continually running off the road to every point of the compass, yelping and barking at a thousand imaginary objects, while their masters plod steadily along. You can all put finger upon such cases in your own departments of thought. In conclusion, then, upon this point, I would advance the thought that in so far as our Colleges are made technical schools, just so far is there danger of producing graduates with distorted views of everything but some special subject.

With this statement of views in regard to the object of a College education, I wish to speak of three things which I consider essential to a successful scientific course of study. so called scientific course, which is decidedly a western inseems to have been originated to supply a "long felt want," viz: a short cut through College, thus gaining in time and eliminating the heavy studies; and it did supply the want admirably. If a man had neither brains enough nor inclination to graduate in four years, he went into the scientific course and graduated in three. The natural consequence was that this department of noble name was filled with most ignoble men, and the classical, from his proud height looked down upon the scientific as decidedly inferior, and, as a rule, he was; I will not dispute that. Evidently the name of the department must be changed, or its standard raised. Of late years, our Colleges seem to be adopting the latter course, the first step being to make the two courses of study of equal length. This removed one difficulty, but left another, viz; what extra studies shall be given to the Scientifics to give them full work? This question has been answered in various ways. The worst possible way was often adopted, viz; to fill in with make-shift studies, not because they fitted on to anything or led to anything, but filled up a gap and counted a recitation. The idea seemed to be that everything worth studying must of course first be put into the classical course, for, as it has been expressed to me; "it would be a shame for a Scientific to graduate, knowing more about anything than a Classical." I have been amused, when arranging a scientific course of study, to hear it said with honest indignation; "why you are giving your Scientifics more botany, more zoology, than the Classicals; the Classical will not get to use the compound microscope at all, or learn blow-pipe analysis, and so on." This discloses what has always been an obstacle in the way of equalizing the two courses, the unwillingness to have anything of value de nied to the classical course. I am not prepared to say that the things I am about to mention are practicable, but to my mind, they are extremely desirable.

I. Natural Science should run continuously through the whole course. This is not such a startling demand as would at first appear. Natural Science is a very comprehensive name and even the departments of it ordinarily taught in College are not a few. Our habit too often is to crowd about two scientific studies per day into the last two years of a College course, and try to make up by cramming, what we have lost in time. Reduce these two studies per day to one and we already have in our curricula material enough to make such studies run continuously through the four years. Botany, Zoology, Physiology, Geology, Chemistry, with all their departments, may well make up one solid study for four years. In a special school of science I would say that no one of these several branches should ever be entirely laid down after it had once been taken up, even if it had to be reduced to one hour per week. In a College I would let the main departments stand as the studies of a special school, and always be represented somewhere and somehow in every term's work. This is desirable for two reasons that are to some extent dependent upon each other: first, it throws such studies further back than is customary, and second, healthy growth in any direction is more the result of constant care and time than of hot-bed forcing. That the study of the Sciences should begin as early as the Freshman year, I no longer doubt, although for some time I held out strenuously against it. I was in the habit of arguing that we needed that maturity of mind that the average Freshman could not furnish. Experience has proved that what is gained in maturity is more than overbalanced by what is lost in the greater rigidity of the mind. Let me record here an experiment per-

formed to illustrate this very point, an experiment upon entirely unconscious subjects. Last year I had some scientific Freshmen thrown upon my hands with the instruction to give them something in Science sufficiently difficult to take the place of the Greek their classical brothers were studying. I gave them a short course in biology, teaching them to observe and reason for themselves after a scientific fashion. They thought they were having an easy time, simply because they were interested, when really they were dealing with some very difficult biological questions. With this preparation the experiment of last term was undertaken. The Senior class was studying Dynamical Geology and its members were groaning over the theories and laws of glaciers, volcanoes, earthquakes, etc It seemed as if they were car. rying all the load they could possibly stand up under. They were doing splendid work, for the class is an unusually fine one. Under the pleasing name of Physiography I approached my Freshmen, now Sophomore Scientifics, with the same subject, explained to them the same laws and theories and was astonished at the readiness with which everything was grasped. And now I can show examination papers, one set written by Sophomores, the other by Seniors, the questions the same, and the answers reading as if all coming from the same class. As regards the advantage gained by lengthening out the time, any teacher will bear me out in the statement, that for lasting effect, one hour a day for a year is far better than two hours a day for half that time.

In the case of studies arranged in what may be called the intermittent way, there is always more or less delay in recovering what has been lost during the quiescent period. The other extreme is equally unsatisfactory, for crowding causes the mind to fairly overflow and the leakage becomes enormous. To make the matter practical, a four years' course in Natural Science could be planned in some such way as this. Let the first year be devoted to general biology, such as the dissection of common plants and animals, teaching how all life is really one, familiarizing pupils with scientific terms and methods of work. The second year could be spent in histological work among plants, and in considering the principles of classification, studying each great group of plants and animals with a view to their relationship, closing with a more detailed study of human physiology. The third year could be devoted to physics and chemistry; the fourth to geology, as the grand cap-sheaf of all the other sciences, the gen-

eral review and marshalling of all the forces of the three previous years, physics and chemistry cropping out in dynamics and structure, and all biological principles finding their fullest exemplification in the life history of the earth. In conclusion upon this point, I wish it understood that by continuousness I do not necessarily mean more science, though that would not hurt, so much as a better distribution of what we have.

My second thought is, that not only Latin, German and French should be required, but some Greek. No one probably now de nies the prime importance of Latin to a scientific man. Not so very long ago all scientific books were written in Latin, and even yet this is very often the language of original descriptions of species. short, it is the universal language of science, and very poorly equipped would any man be who entered the field of science without A knowledge of the German and French languages is necessary to keep the student abreast of his chosen studies, for original research in France and Germany, especially the latter, is far ahead of anything in this country, or England, and in these days it is exceedingly unprofitable to wait for an interpreter. Now, while I do not consider Greek as essential to the student of science as any one of the other languages mentioned, it is essential to any one desiring to be master of his subject. Look over the glossaries appended to our various text books in science, and you will find the great majority of the terms made from the wonderfully flexible Greek. No other language can come so near describing an object in a single smooth word. Time and again have I been annoyed in the class room by a lack of any idea of the Greek. Terms and names so simple, so apparent in their derivation that it seems as though any one should know what they mean, become appalling bugbears to the Scientific who, if he attempts them at all, does so with fear and trembling and with no more idea of their applicability than if an algebraic symbol had been used instead. What do such names as Ichthyosaur, Pterodactyl, Megatherium, Zeuglodon, etc., suggest to the average Scientific? What a world of suggestion is in them to the classical scholar. The names to him define themselves. Botany, Zoology, Geology, every science is so full of Greek words that it seems almost unreasonable to expect a complete understanding of these subjects without some knowledge . of Greek. But the question arises, how much time should be given to the study of Greek in the scientific course? I would say at least

one year. I know that Professors of Greek will say it might just as well not be studied at all. That is true, if our object is a thorough knowledge of the structure and spirit of the Greek language, having in view a study of its literature; but in this case the study would simply be directed to a better understanding of scientific words and the methods in which descriptive terms are made. I feel confident that a year of this kind of study would make a vast difference in the ease and comfort with which a student could master scientific text books. Of course this would have to be a special class, as no single year of Greek in the classical course would answer the purpose. Understand me, not as saying that one year of Greek would be amply sufficient, but that it is the least possible amount that could be made useful and is far better than no Greek at all. No scientific man was ever spoiled by having too much Greek, and the great masters in science to day are all acquainted with this language.

III. My third thought is this - There should be greater difference between the Scientific and Classical courses in the Senior year than in any other. This I think is one of the most radical defects in our so called scientific course of study. It begins to leave the other early in the College course, becomes farther and farther removed from it in subsequent years, but suddenly, in the Senior year, turns squarely around and Scientific and Classical both come out together, pursuing exactly the same studies as if they had always been together and had the same end in view. The scientific course is thus made to lead nowhere and too often comes to nothing. The Senior year, in both courses, has often struck me as one in which all definite aim was abandoned and a perfect conglomerate of studies introduced, leading to nothing but confusion. There seems to be no natural connection between the stu dent's earlier training and that given him in his last year. Prof. C. E. Bessey well expressed my idea in an address delivered to the State Teacher's Association of Iowa four years ago. He said-"The fact is, we go at this matter in the wrong way. Our half dozen or dozen Professors are like so many specialists in house-building, who, instead of all working together, work independently. The mortar-maker, the hod-carrier, the wall-builder, the chimney-builder consult no common plan, but perform their allotted tasks according to their individual convenience; the joiner makes doors and windows when and where he chooses, and so the building grows in its grotesqueness, until at h e end of so many years, with no regard for the intended nature of

the building, a bell-tower and a steeple are fastened over it all." This perhaps puts the case a little strongly, and expresses the state of things in our Colleges better ten years ago than to-day, but still it gives the direction in which our Senior year is still weak. If literature and science are the distinguishing marks of the two courses, let literature and science dominate in the Senior year more than ever before, with very little literature for the Scientifics and very little science for the Classicals. I am not prepared to specify exactly what studies should be pursued; that could be easily arranged by the Professors into whose departments the two sections of the class seemed most naturally to fall. In the scientific course I would suggest such studies as Paleontology, with laboratory work in the naming of fossils; advanced Dynamical Geology; Cryptogamic Botany; advanced Chemistry or Astronomy. There are very many such subjects from which could easily be selected what would make a full year of hard and profitable work, work that would depend directly upon the studies of the previous years. For the Classicals, the Professors of Literature, Ethics, Metaphysics, and the various languages could suggest a sufficient amount of most fascinating study In the Senior year, I should think that the modern languages need to be the only point of contact between the two courses. Possibly some Metaphysics should also be included, for it touches very closely upon some of the Natural Sciences, notably

Ready to be convinced of error in any or all of the points presented in this paper, and only desiring to learn the best methods of doing our work, I leave the subject in your hands, hoping to hear expressions of opinion from every College represented in this Association.

The formal discussion of Professor Coulter's paper was opened by Dr. J. M. Mansfield, of Asbury University, who gave an interesting description of some of the European laboratories. His remarks unfortunately, were not committed to writing and hence can not be published.

The general discussion of the subject was continued by Prof A. W. Brayton of the Central College of Physicians and Surgeons, President Moss of Indiana University, Dr. Ridpath of Asbury University, Prof. Coulter of Wabash College, Dr. Earp of Asbury, Drs. Burgess and Benton of Butler University.

The next regular paper was read by Dr. J. C. Ridpath of Asbury University.

THE BEECH-TREE IN HISTORY. DOCTOR JOHN CLARK RIDPATH.

Light has come down from an unexpected source on the vexed problem of the antiquity of man in Europe. The science of language is the bringer in of the dawn. A simple fact, brought out in the comparison of the early Aryan Dialects, has cast a pencil of rays into the remotest and most obscure corner of the Prehistoric Age. The fact in question is neither more nor less than this: The word which in Greek ought to mean beech tree does not mean beech tree but oak-tree. That is, in all the Aryan tongues of Europe a given word is used to designate a forest tree; that forest tree is the beech-tree in all cases except the Greek; in that language the word means not beech but oak. It is no paradox to say that in Greek beech means oak!

To illustrate the idea more fully: In Old High German puocha meant beech; in Gothic boka was beech; when the Romans said fagus they meant beech; in the Old Russ buk meant beech; with our Anglo Saxon forefathers bece was beech; but when the Greek said φηγός he meant not beech but oak. All of these words, however, when tested by Grimm's Law are found to be identical—that is, identical as to their consonantal structure. This identity proves that the words in question were in use before the tribal separation of the Teutonic, Hellenic, and Latin races. That is, in the old Aryan homestead of Bac tria, before Sanskrit was Sanskrit or Greek was Greek, a given forest tree was named (perhaps the original word was phacha), and that name became, among the various migrating tribes, the progenitor of the words puocha, boka, fagus, buk, bece, and φηγός—all meaning beech except the last which means oak. How can so strange an exception to the general laws of language be accounted for? How did it happen that, in so simple a matter as naming the trees of the forest, a family of nations, descended from a common stock and speaking dialects of a common language, should agree that a given word should mean beech-tree, while a solitary member of that family with singular perversity of tongue insisted that the same word should mean oak-tree? The answer to these questions will tend to show by what a careful induction the science of language is progressing, and also upon what

a slender footing a historical theory may be made to stand—and stand securely.

The word $\varphi_{n\gamma}\dot{\phi}_{\zeta}$ in Greek is derived from the verb $\varphi_{\alpha\gamma}\tilde{\epsilon}_{i\nu}$, mean ing to eat. It is therefore evident that the tree called $\varphi \eta \gamma \dot{\phi} c$ by the early Hellenic Aryans was either itself eaten as to its leaves or bark, or, which is far more likely, that its fruit was used for food. As men have never been much given to browsing, we may safely adopt the latter conclusion; namely, that the fruit of the $\varphi \eta \gamma \delta \zeta$ was eaten, and not the tree itself. This supposition is indeed fully borne out by the facts; for in the early Greek literature we find the word corroc indiscriminately applied to the tree and to its fruit. That is, the oak was called $\varphi\eta\gamma\delta\zeta$, and so was the acorn. This is all satisfactory enough, and the Greeks seem to have the argument. They said ¢arēiv, to eat; what they are would therefore be called $\varphi\eta\gamma\delta\varsigma$; they are the acorn and named it accordingly. And then, by an easy metonomy, they called the tree φηγός also. Nevertheless, all the other Aryan tribes insisted with entire unanimity that the Greeks were wrong: that $\varphi n r \phi c$ as applied to the oak was a misnomer; and that the beech is the true $\varphi \eta \gamma \dot{\phi} \zeta$ the world over. The explanation of this difficulty is to be found in the peat bogs of Denmark.

The peat measures of Northern Europe lie in ravines, hollows, and marshes. The formations in a given bog are generally three in number, the lowest being a layer of peat about three feet in thickness and sometimes as much as thirty feet beneath the surface. Above this bottom layer in the bed is found a thin stratum of clay and mud, marking a break in the turf-producing vegetation. Then follows another layer of peat, thicker than the first, and bounded above by a second stratum of mucky clav, again indicative of a cessation in the growth of the turf. Above this is the third bed of peat, extending to within a few feet of the surface and covered with the heavy bog earth peculiar to such localities.

Now all of these layers of peat are intermingled with logs of wood. Forest trees, growing around the edge of the bog, have fallen in, and the trunks, imbedded in the peat, have remained in excellent preservation. The remarkable part is that this fallen timber gives unmistakable proof that at different epochs different kinds of forest have prevailed in the country. In the lowest stratum of peat the logs are of the Scotch fir, the *Pinus sylvestris* of botany. Many of them are as

much as three feet in diameter; and the number is so great as to prove conclusively that during the formation of the lowest layer a fir forest prevailed in Denmark. The fir, however, is not now a native of the Danish peninsulas and islands, and will not even grow there when transplanted. Coming to the second layer of peat, the fir logs disappear and their place is taken by the trunks of oaks which have fallen in during the formation of that stratum, and have been preserv ed in the same manner as the fir in the layer below. But the oak also has long since disappeared from the native forests of Denmark, or at most has maintained but a straggling and precarious existence. In the upper layer of peat there is also a plentiful distribution of logs, but here they are of neither fir n r oak, but of beech. At the present day heavy beech woods prevail in the greater part of Denmark, and what is of the greatest importance, such has been the p evalent forest tree since the earliest epochs of history and tradition. It is well known that as far back as the times of the Roman Republic magnificent forests of beech covered the greater portion of the Danish coasts.

Thus it appears that in Northern Europe the woods have passed through several metamorphoses. The first change, that from fir to oak, was entirely prehistoric, corresponding with what is known in archæology as the Age of Stone, and coincident with the formation of the lowest layer of the Danish peats. This change from fir to oak was completed at that geological crisis which is marked by the stratum of clay above the lowest layer in the bog. The oak forest continued to prevail during the formation of the heavy peat bed above, and was terminated, or nearly so, by that change in climate which again checked the growth of the peat material. This change is indicated by the second stratum of clay. The next metamorphosis was that from oak to beech, marked by the absence of oak and the deposition of beech logs in the upper bed of the bog. These logs are of the same species as those now growing in the Danish forests; from which it appears that beech woods have covered those northern coasts from the time when the second layer of peat in the bogs was completed. This period we know antedates the first references made by the Latin authors to the character of the forest; and we have every reason to believe that the Era of the Beech runs back to a time much more remote. After very careful computations, Professor Streenstrup, the Swedish naturalist, has placed the period of the metamorphosis of the

oak forest into beech at a minimum of two thousand years before Christ.

Such, then, have been the general changes which have taken place in the forest-growth of Northern and Western Europe. But let it be borne in mind that in Eastern Europe the transformation has not been so rapid. In Greece the metamorphosis has, at the present day, proceeded no farther than the oak which is still the prevalent growth of the woods. This, too, is the case in several of the Oriental countries. As far east as Persia the oak still prevails, the beech not having appeared; and what is of great importance, in the Persian language the word buk (identical with the Greek $\varphi\eta\gamma\delta\varsigma$) means oakand not beech! So that the Greek can at any rate cite Asiatic authority for the linguistic heterodoxy of calling one tree by the name of another.

Enough has now been advanced to make clear the theory which it is the purpose of this address to present. That theory is briefly this: The various Arvan tribes - belonging to the Hellenic, Italic, and Teu tonic families-came into Europe and covered the habitable regions between the Baltic and the Mediterranean, during the Era of the Oak; that is, while the oak forest still prevailed in all parts of the continent. These pagan barbarians lived in the woods, and were in a great measure dependent upon the products of the woods for subsistence. Among those products the esculent fruit of the oak held so prominent a place as to be called by preemmence the food, φηγός. This word, under the working of Grimm's Law was, as we have seen, varied among the different tribes, appearing under the forms boka, puocha, fagus, bece, and beech. In all the languages, for a while, the word was limited to the fruit, the thing eaten. By and by, a commonplace metonomy transferred the word to the tree which produced the fruit. Soon the same linguistic law gave to the word a general signification, applying it to the whole forest; so that the barbarian instead of saying that he would go out into the woods, hunt in the woods, sleep in the woods, etc., said that he would go out into the beech, hunt in the beech, sleep in the beech, etc. But bear in mind that as yet beech meant oak. In our great Northwestern forests I have heard the hunters speak of killing bear in the pine, of seeing an Indian wig wam in the pine, etc., etc. Now it is a well known law of language that the generic meanings of words outlast their specific meanings. So when the Aryan pagans of Europe, under the first impulses of civilization, began to change their manner of life and to live no longer chief ly on the wild gifts of the woods, the words $\varphi\eta\gamma\delta\varsigma$, boka, puocha, etc., were retained in the vocabularies of the various tribes as the general appellatives for the prevalent forest, whatever that might be.

Such was the condition of affairs when that climatic change occurred by which, in Western and Northern Europe, the oak forest was transformed into a forest of beech. In all those regions where such transformation occurred, the words φηγός, boka, puocha, fagus, and bece, were carried over from the old woods to the new; so that the word which originally signified an acorn, then came to mean oak, and finally to be used as an appellative for forest in general, -now reappeared, or was retained rather, as the name of the new beech woods which covered the country. In Greece and in Persia, where the oak forest was not transformed, the word would of course remain as the specific appellative of oak, or the more general name for oak woods. Hence would arise, as the different languages became crys talized in their respective literatures, a discrepancy in the sense of the words under consideration. In Greek φηγός would still mean oak, while in all the other Aryan dialects of Europe the same word would mean beech.

It only remains to point out clearly the bearing of this inquiry upon the antiquity of man, or more properly the antiquity of the Aryan race, in Europe. That race came from the East, bearing implements of bronze. Such implements are first found on a level with the oak logs in the second layer of peat. This is proof corroborative. Below that level are ruder implements of copper; and in the lower layer of peat the usual relics of the Stone Age are found. Professor Steenstrup has himself taken a stone hatchet from the under side of a Scotch fir log buried at a great depth in the lowest stratum of the peat. Among the beech logs of the upper layer iron implements are found, variable in character and finish. Now, according to the best estimates, the beech forest, as has been already said, has prevailed in the northern parts of Europe for as much as four thousand years. This would carry us back fully two thousand years before Christ as the minimum date for the transformation of oak into beech. Long before that time, back in the Era of the Oak, the barbarous tribes of our own Indo-Europic ancestry, speaking dialects of a common language, were already well distributed between the Mediterranean and the Baltic, having driven out the feebler aborigines with their rude stone and copper weapons, and taken posession of the country. It seems not unlikely, then, that as much as three thousand years before Christ the pagan forefathers of Greeks and Celts, Romans and Goths, were already strolling through the oak woods of Europe and waiting for the autumnal frost to fling to earth the wild abundance overhead. They called it $\varphi\eta\gamma\delta\varsigma$, something to be eaten.

It is almost needless to add that for the development of theories such as this, tending to elucidate the obscure history of the primitive races, modern scholars are more indebted to Prof. Max Mueller of Oxford than to any other man living.

The next regular paper was read by Prof. Catharine Merrill of Butler University.

THE EXILES OF SALSBURG.

PROFESSOR CATHARINE MERRILL.

Salsburg is but a little province, scarcely mentioned in the history of the world, not marked on the map of the world, yet it has a record of its own, a record of both glory and shame like that of great countries; and it has a beauty of its own, that wild grand, airy, graceful beauty peculiar to Alpine regions. It lies on the N. E. slope of the Tyrolese Alps; and through the swift Salzach and the rushing Inn sends its tribute from glacier and from crystal lake to the Danube.

Its rugged rocks give a stingy foothold in cracks and crannies, or on some lofty bit of plain to forests of fir, to free, upspringing larches, and to gigantic solitary chestnuts; and they nourish mosses that are like carpets or cushions for softness, and flowers that literally shine. In the valleys and on the acclivities are sweet-clover, blue-bells, crocuses, "crimson-tipped daisies," pansies that might be the nurselings of a city gardener, and wild thyme, called by the peasants *Mutter Gottes Blume* (the Virgin Mary's flower), which under the foot of the climber upward gives out invigorating odors. Far up the heights are the forget me-not, with almost impalpable petals of Heaven's own blue, and the Alpine rose, a celestial red. Higher yet is the brown Brunellen, its patient foot in the snow, and still higher is the Edelweiss, which the chamois hunter proudly puts in his hat as a boast of the dangers he has dared.

Above gorges in which lies the eternal snow, the dauntless trav-

eler finds sometimes a garden spot not larger than a dining table in which seem to be crowded all the dainty flowers of the world looking up to their neighbors the sun and the stars.

The province bears crops chiefly of barley and rye, though also of buckwheat and Indian corn; and it possesses valuable mines of iron; but it takes its name from its salt mines, salz, salt; and burg, citadel or fortress, for it is a citadel of rock-salt. The salt mines are the deepest and most extensive in the world. They are never penetrated by light or sound from the outside; their winding passages and high wide white halls sparkle in the light of lamps and resound with hammer and chisel and the hollow roar of the blasting powder. Vast caverns, excavated by the hand of nature, fill the mountains with black and silent chambers. It is in one of these, according to the story, that fiery Barbarossa locked in the chains of an enchanted sleep awaited through silent centuries the restoration of German unity. Through the marble table that supported his head, his red beard had grown, long before the coming of Bismarck and Kaiser Wilhelm.

As I said, Salsburg makes but a small figure in the world's history, yet, as long ago as the Emperor Hadrian's time its capital under the name of Juvavia was the capital of Noricum. It suffered plunder and devastation at the hands of Alaric and Attila and Odoacer, the Hernler king. After Odoacer, its inhabitants dwelt among ruins two centuries, until a Christian bishop built a church and formed the province into a bishopric. A hundred years more and archbishops were throned here. They lived in sovereign state and pride and power with a wide diocese and many cathedrals and cloisters. In peace they ranked with kings, in war they acted as generals. They wore armor and carried arms, figured in tourneys, and led armies to battle. As the papal power grew they attached themselves to the Pope and assisted heart and hand in the humiliation of his enemies. bishop of Salsburg gloated over the spectacle of Henry IV, standing barefoot before the gates of Canossa. With few exceptions his successors emulated his arrogance, though they expended it chiefly on their subjects. These subjects were peasants, industrious, patient, and peaceable, but—accustomed as they were to wrest their subsistence from the cruel rock, in awful depths and on dizzy heights to stand face to face with death—they were also thoughtful, fearless, and true. Men who mow their grass at the risk of life, finding a perilous security in the rope

that binds some half dozen together on the slippery steep; who every day snatch their lives from destruction and every day feel that life is a new gift, have no false respect for power. The crowned head, the mitred head, and the cowled head are but the heads of men who are all equally insignificant and helpless before the mighty powers of nature. Hardship and toil alone may break the spirit of men, but when they are united with danger, which is fairly met, they form the soul to freedom. Time has been when in all the world liberty found no shelter but in the mountains of the Swiss and behind the dykes of the Dutch.

The Salzburgers by some means, now unknown, became acquainted with the Bible, and they built up at once a system of doctrine at variance with the system of the church. Penance, the confessional, the worship of images, the infallibility of the Pope, priestly absolution of sin, they adjured, and this in spite of cord and stake and pool and dungeon.

Nearly a century before Luther was born an honest priest was burned for preaching the scriptures. During three hundred years the peasants of Salsburg quietly held a faith opposed to that of a powerful and arbitrary church, which had as its instrument the resources of a powerful and arbitrary state.

After a tempest of persecution, one generation, two generations, or even three, passed through life quietly under cover of the observance of prescribed forms. In 1614 inquisitors discovered that all the Catholic churches in one district were empty, while the churches in another district where Luther's doctrines were preached were crowded; they discovered also that of nearly 3,000 people only 300 declared themselves Catholic. Zealous missionaries zealously supported by the sword succeeded in putting another face on matters; but it was only another face. Heresy still flourished, and in the second generation was again betrayed. In their extremity the peasants took courage, openly declared their opposition to confession and the mass; fearlessly appeared when summoned to trial; presented their written articles of belief; begged to be allowed their own forms of worship; and entreated that their children, of whom they had been deprived, might be restored to them.

Their courage, their candor, and their forbearance were met with contempt and insult. Peasants to dare in the face of the court, of authorities both civil and ecclesiastical to assert their own opinions, and beliefs and rights. It certainly was bold. The dogs of the law were let loose upon them. Their books were cast into the flames. Their children, 600 children, many of them infants, were taken from their arms and locked up in cloisters, and the heretics themselves were banished. A thousand men and women in troops of 50 and 60 were pitilessly driven into foreign countries, where the old and feeble had no resource but beggary—a thing these upright, independent, souls ab horred. A song written by one of their number and sung by the exiles wherever they wandered, opened the doors of the charitable. Its extreme simplicity is so characteristic that I translate a few lines:

He who sings this simple song, is here to all unknown, He hates right well the Pope's vile wrong, he worships Christ alone."

The author, Joseph Shaitberger, afterwards wrote a letter of en couragement to the mountaineers and miners who were left behind. This letter was long held as second only to the Holy Scriptures; it is still read to their edification by devout Christians. Shaitberger eked out a long and miserable existence in Nuremberg, seeing fifty years from the date of his own exile, a still greater and more melancholy banishment of his people.

All Germany was indignant, not only at the tyranny and inhumanity of the archbishop, but because of his gross violation of the treaty of Westphalia; but sovereigns and communities remonstrated and interceded in vain.

Many a father dared the dangers of a return for the sake of delivering his children from the lives of nuns and monks to which the church had devoted them. But if at midnight he stole them away, it was but to yield them again before he reached the border to the officers of the watchful government.

About the year 1700 the archbishop flattered himself that heresy was rooted out of the land. But, as if carried by birds and breezes the seed that fell literally among rocks, in the remotest places, at al-

most inaccessible heights, found soil and grew. Without teacher or preacher new communities built themselves up.

They met at night in the depths of forests or rocks, dug their Bibles from the earth and had such prayer meetings as are probably not now known upon the earth.

In 1728 Pope Benedict prescribed the greeting, "Praised be the Lord Jesus Christ" (instead of "Good morning," or "Good day") with the response, "From now on through eternity," promising two hundred days, absolution from purgatory for every utterance on ordinary occasions, and 2000 years' absolution for its use on the death bed. As devout papists at once accepted the form, repeating it whenever they met an acquaintance and nailing it on their doors as if it were a charm to keep away evil spirits, suspicion was roused against those who pursued the contrary course.

The archbishop said, "We must destroy these people or they will destroy us." "I will clear these heretics out of my land if I have nothing left but thorns and 'thistles." And he set Jesuits, policemen and soldiers in chase of his victims.

The peasants joined hands and as a sign that not mere boasting filled their mouths, and that they were united indissolubly to God and to each other, they called their union the Salt-bond. Salt common to all and to them most common was still of sacred significance.

It gave them the means of subsistence It formed crystal palaces, and domes and labyrinths, far remote from the light of the sun. It provided that Saviour, who was dearer to them than their life-blood, with a text for his teachings. It is pure and purifying, enduring and preserving. On the 5th of August, 1731, more than a hundred delegates of the Protestant communities met for mutual encouragement and counsel. At the close of a consultation which convinced them they had no mercy to expect, with uncovered heads, folded hands and streaming eyes, they knelt in a circle around a table hewed out of rock-salt. One took up the word, and said, "We must be prepared to be hunted and brought before courts. Is there one among us who cannot give himself up entirely to the will of God, but who fears torture and misery, let him strengthen himself in prayer. Is he still weak and fearful, let him remain behind and separate himself from the chosen band, whose watchword is, 'The sword of the Lord and of Gideon.' And as Gideon led his band to the water and tried them

whether they lapped water like dogs or not, so let him who is resolved to suffer all with the assistance of the Holy Ghost, approach the table, put his finger in the salt, and carry it to his lips."

Man by man, in profound silence, they tasted the salt, which stood in a vessel in the center of the table. and raising their right hand they swore, that they, in life and in death, would freely confess the Lord Jesus, that they would ever preserve the salt of faith, and that they would live in peace with one another.

To this day, in Schwarzach, is shown a table-leaf of white rock-salt, with the inscription, written by a Catholic hand: "This is the table at which the Lutheran peasants licked salt."

A greater boldness followed this consecration. And a more intense and bitter persecution followed the boldness. The mountain passes were beset by imperial soldiers. Men were dragged out of their beds at midnight, and driven to dungeons like sheep to slaughter, while they were taunted with the neglect of their brothers in the faith. "Where are the Brandenburgers? the Swiss? the Swedes? the Danes? the English? Why do they hold aloof?" They were compelled to march through public streets, while bells rang, the mob hooted, and counts and barons, sitting on horseback, railed and derided.

Weary of life, the poor, abused, broken-hearted peasants prayed, "Oh that the help of the Lord would come out of Zion, and that the Lord would deliver his imprisoned people!"

The cup of their sorrow was not full, until on the last day of October, 1731, a proclamation was issued to the purport that they must leave the country within eight days—with the exception of property-hilders, to whom a respite of three months was allowed. As sales could be made only on the terms of the purchaser, many a land owner was forced to abandon house and ground worth ten thousand or twenty thousand gulden. Many a wealthy peasant left a hundred cattle standing in his stables.

The early winter had already whitened the land, when the exiles with staff in hand, set out on their pilgrimage. They came down from the mountain, out from the valley, up from the mine, from under the very walls of the archbishop's palace, 30,000 in number. They themselves were amazed. The feeble aged and the tender young were here and there in carts. Their bundles of clothes were stowed away in baggage wagons. With streaming eyes, and, it is said, with groans

and cries, the exiles looked their last on their beloved home. But we may well believe that not one of all the sad-hearted throng would have laid by his dusty shoes and taken up his residence in the palace of his persecutor.

With slow and melancholy movement the broken procession of pilgrims and wanderers passed out of Austria into reformed and modern Germany. At once the melancholy train became a triumphal procession. Bells sent forth peals of welcome. Cottagers stood by the road-side and showered blessings. Princes opened the doors of their palaces and offered their warmest seats and their softest beds. Preachers made the exiles the theme of their discourse. Preachers and laymen alike were inspired to live holier lives.

Where shall they go? What shall be done with them? were questions as promptly answered as they were asked. George II, of England offered them homes in America. The English Society for Pro moting Christian Knowledge, besides making large remittances to Germany, from 1733 to 1735 sent over more than 150 of the exiles to the English colony in Georgia, where they settled by themselves at Ebenezer on the Savannah. Our country boasts noble blood; but the Puritans of New England, the Huguenots of the Carolinas and of New Jersey, the Quakers of Pennsylvania, have not a more heroic history than the Tyrolese of Georgia. All the kings and states of northern Europe offered refuge, but no Protestant sovereign was so able to give a convenient and accessible asylum as was the king of Prussia. Frederick William did not lose his opportunity. Harsh he might be and was to his skeptical and wayward children, but he was gentle and generous to those who suffered for a principle. Moreover he was a practical man, and saw in this sudden expulsion of the best peasants of Austria a means of restoring and repeopling Lithuania, a Prussian province, of late years ravaged and devastated by pestilence, 300,000 people having died of disease and famine, 52 towns and hundreds of thousands of acres having gone to waste. He sent commissioners, therefore, to look up the Salzburgers, now wandering in the cold uplands of Bavaria, or still streaming out of the borders of Austria, and to invite them to homes in Lithuania. He directed that those who accepted his invitation should move in small bodies by different routes and he needlessly exhorted all German princes to be kind, and "not hinder them and me."

In the cold, raw days of February, one of the first companies of the refugees, three hundred and thirty-one in number, moved towards the little town of Nordlingen in Bavaria, there to await the Prussian commissary. When their approach was known, the towns-people led by two clergymen, went out to meet them, finding them, men, women and little ones, with their ox carts and baggage wagons, awaiting in the open field, an invitation to enter. "Come in, ye blessed of the Lord! Why stand ye without?" cried a clergyman. It is a no ticeable thing that everywhere these poor wanderers were addressed in the language of Scripture, as if unconsciously in their presence, men adopted an elevated, heroic tone. They entered the town, going straight to the church, and occupying the central seats; and while their hosts (the citizens all, were their hosts) stood around them they were welcomed in two short addresses; one from the text; "And every one that hath forsaken houses, or brethren, or sisters, or father, or mother, or children, or lands for my name's sake, shall receive a hundred fold, and shall inherit eternal life;" The other from the verse: "Now the Lord said unto Abram, 'Get thee out of thy country, and from thy kindred, and from thy father's house into a land that I will show thee."

The third of May on a Saturday afternoon many hundred Wittenbergers went out from their ancient town, Luther's Wittenberg, to meet nearly a thousand of the Salzburgers. Hastening through their narrow and crooked streets they waited on the banks of the Elbe in solemn expectation. At half past six o'clock a cloud of dust rose from the South. Emerging from the dust came a wavering, motley throng, families, and fragments of families, stretching from hill to hill, beyond the reach of the eye. All were on foot except a few aged and sick who were divided among eleven wagons of household go ds. When they had crossed the river, the strangers moved on, slowly for they were tired, and sang the trustful old German hymn beginning, "All is well that our God does." They then struck up that martial hymn of Luther's: "A great stronghold our God is still." The University students, falling into line at the head of the procession added their voices. Another and yet another hymn was sung as the procession moved to the public square. It seemed that only music and de votion could express reciprocal welcome and trust. The Rector of the University assured the pilgrims that Wittenberg esteemed it a great honor to receive so many confessors of the evangelical truth,

which God had thought her first worthy to send forth. Monday the travellers, refreshed by rest, encouraged and enriched by blessings and gifts, continued their journey.

Perhaps a hundred towns could tell such stories of the reception of the wanderers. A march of 700 miles beyond Wittenberg brought them to the capital of Prussia, at the gate of which the King and Queen honored themselves by meeting the exiles and personally giving them welcome. Five hundred more long miles, and the pilgrims found homes—cottages and fields, implements of husbandry and stock—all ready for them. Seventeen thousand of the exiles of Salzberg found homes in Lithuania.

Under their industrious hands, the waste blossomed, trade flourished, and abundance reigned; there were more towns and more flocks than there ever had been in Lithuania, more wealth and more productiveness than in any other part of Germany.

The beautiful mountain land, that had been robbed of her noble offspring, presented a sad contrast to the fields of her rival. Her farms were deserted, her villages were left without an inhabitant, her mines were abandoned to emptiness and ruin. The archbishop gnashed his teeth in rage. For eleven hundred years his had been a princely power. But with his honest peasantry, his glory departed. Thorns and thistles yielded him so poor a revenue that he was unable to defend himself against the arrogance of Austria, the enmity of Bavaria, and later, the ambition of Napoleon.

Dr. Benton presented the Treasurer's report for the last three years. The financial condition of the Association was discussed by several members. The following names were reported for membership: C. R. Barnes, Prof. Nat. Hist., Purdue University; A. W. Brayton, M. D., Prof. Chemistry, Central Coll. Phys. and Surg.; A. H. Young, Prof. Nat. Sci., Hanover College; C. H. Kiracofe, President Hartsville University; Ira A. F. Lyons, M. D., Prof. Opthalmology, Otology and Laryngoscopy, Cent. Coll. Phys. and Surg.; W. W. Butterfield, M. D., Prof. Human and Comparative Histology and Mic. Technology, Cent. Coll. Phys. and Surg.; G. C. Smythe, M. D., Prof. Practice of Medicine and Sanitary Science, Cent. Coll. Phys. and Surg.; Calvin W. Pearson, A. M., Ph. D., Prof. German, French and History, Earlham College.

The Association then adjourned to meet at 2 P. M.

The Association was called to order by President Benton.

The first regular address of the afternoon was delivered by President D. W. Fisher of Hanover College.

THE LIMITS OF SCIENCE. PRESIDENT D. W. FISHER.

The design of this paper is two fold. It is intended to emphasize the truth that science has bounds, toward which it ought constantly to press, but beyond which it is impossible that it should go. It is also intended to indicate how these limits are constituted and the general regions where they lie. As to the second of these undertakings no pretension is here made to anything like completeness. Scholarship may be approaching a position whence it will be possible to make an exact survey of the entire territory which is legitimate to science, and also thoroughly to mark its boundaries. At present any such attempt would be premature, or at best merely tentative All that can fairly be expected in this brief paper is that a few general principles shall be laid down which may serve as guides on the way.

At the outset of this discussion an exact definition of science would be very desirable. Unfortunately this desideratum cannot be supplied. Science is an abstract notion, to which there is in nature no kind which exactly corresponds. Men are left to themselves to decide what is the precise content which shall be assigned to it. Consequently, while there is, as to its meaning in general, an agreement sufficient to indicate that it has a real existence and is not a mere fiction of the imagination, there is no such concurrence as to its exact signification. Jevons, describing rather than defining it, says that, "Science arises from the discovery of Identity amidst Diversity." Perhaps it is impossible to bring it, in all of its phases, under a more comprehensive dictum. But this dictum is so broad that it includes much which it would seem frivolous to call scientific. At the same time it needs to be supplemented by another statement, that this identity amidst diversity is discovered under forms which are widely separated from each other. In some cases, the end sought by science is the cause which produces certain effects; in others, it is composition shown by the resolution of compounds into their elements; and in others still, it is classification according to rules which have their warrant in nature herself; in all cases, identity amidst diversity, but under phases so different that the dictum comprehends them only in the most

general sense. What is science, remains a question to which no final answer has been made. Consequently the name is used, in its extent, with very great latitude, sometimes being employed within legitimate limits, and again being stretched so as to cover opinions and theories which as little deserve it as does the *Homunculus* of Goethe's Faust, or the Shandean Philosophy of Sterne.

Happily, for our present purpose no very accurate definition is indispensable. The word science, which as by magic causes the doors of many minds to open, though at any other sound they would remain bolted, after all is nothing more than the Latin derivative which corresponds exactly to the Anglo Saxon, Knowledge. Science is only human knowledge. Through custom, we have vaguely associated with it a more limited meaning. But define it as we may, Knowledge is the genus to which it belongs. What are its differentia, we need not stop to discuss; for, the limits which are to be indicated in this paper are such as pertain either to all human knowledge, or to science according to any meaning which may be put upon it. Let one thing, however, be carefully noted. It is that the name of science belongs just as properly to what may be known of mind as to what may be known of matter; to psychology just as truly as to physiology, to logic as truly as to zoology.

Science is limited in three general ways. I. By the number of the faculties of the human mind. That we can know objects only so far as we have faculties with which to know them, is so manifest a truism that it seems almost to be superfluous to state it. Now, there may be in existence vast multitudes of objects which we have no power to cognize. They do not have those qualities which enable us to have any experience of them. To say that there certainly are such objects would be unwarranted, because this would involve the contradiction of knowing something about that of which we are wholly ignorant. We have no basis upon which to decide as to what is probable in the case. But we may be sure that such objects may exist. Nothing but an excessive pride of intellect, or a philosophy of the Absolute which leaves no place for human ignorance, gainsays this position. stance, besides mind and matter, and possibly space, there may be other substances which fall under none of these classes. we can know nothing of them because we have no faculties which are capable of cognizing them. Again, it is equally possible that both matter and spirit, the two substances with which we are familiar, may

have multitudes of attributes and relations, of which we are wholly ignorant because they do not fall within the domain of the acting powers of the soul. It is conceivable that there are intelligent beings who have ten special senses, instead of the five to which we are limited. Corresponding with these additional senses there may be as many more attributes of matter than are known to us. Philosophically, it is possible that there are faculties of the human soul which are wholly dormant in this life but which in the life to come will be awakened into vigorous activity, and that by them whole realms of knowledge, now hidden from us, will be accessible. This limitation differs from the others which are to be mentioned, in the fact, that it is not to us a certainty. It may or it may not exist. The others are realities beyond all question.

II. By certain teltimate truths. These are truths, which, in the use of our faculties, we inevitably assume, but which are not derived from experience, or by any process of judgment or reasoning. In the abstract form in which they are enunciated when we write or speak about them, they never appear in consciousness; but they show them selves in the concrete, in individual cases, and we act spontaneously upon them. We have no right to regard them as mere forms of thought which the mind imposes upon the material with which it deals. They answer to realities according to the very nature of things. Whether it is possible for any intelligent being to resolve them into simple elements, we do not know. To us at least, they are ultimate truths. The human mind, in knowing, states with them; it cannot go behind them. Science in them reaches one of its limits.

In this paper it is possible to give only a few examples. There can be no act of consciousness which does not involve several of these ultimate truths. Let it contain nothing more than is expressed by the cogito of Descartes; we thereby assume and by implication assert, that belonging to us is an entity, that it has personality, and that this personal entity is a cause which produces an effect which we call think ing. It would be difficult for us to select three more important ideas from all the range of human knowledge. Here, we have quietly assumed them; and all the science of the world is impotent to go behind them, or to give any explanation of their origin except that they are born with the soul.

In every act of sense perception, we, in like manner, assume the

reality of matter as a substance, having extension in space, externality and impenetrability. No amount of philosophical speculation can induce any sane man for a moment to act in accordance with the the ory of idealism, although idealism is incapable of any refutation except by an appeal to the knowledge of matter which the soul when brought into contact with it intuitively possesses. But in every act of sense perception we go still further, and assume the existence of commerce between matter and mind, yet how can such a thing be? Between these two substances there seems to be no common bond. They are the opposite of each other. The one is tangible; the other is intangible. The one exists in space; the other, in time. The energy of the one seems to consist in the negative quality which we call inertia; the energy of the other manifests itself in the positive force of which we are conscious in thought, feeling, and will. What can science do with such a mystery? If the vain effort to resolve mind into a function of matter could succeed, we would still not have approached a solution of the problem. In that case the question would still remain. How can such a substance have a function so incongruous with itself. and so different from every other which it possesses? Nevertheless, all our knowledge of our own bodies and of all other material objects postulates the reality of this commerce. It is to us an aultimate truth.

In like manner, in memory we assume the relation of time and of identity. In the formation of the notion we assume the relation of similarity; in the judgment, that of agreement or disagreement; in the deduction, that of the whole and its parts. In fact, no act of intelligence can be performed which does not involve one or more of these primitive ideas

Then in the inductions, which are so prominent in almost all the sciences and especially in those which are physical, not a step can be taken until certain ultimate truths are postulated. Eliminate such intuitive cognitions as substance and attribute, such intuitive beliefs as time and space, such intuitive judgments as cause and effect, and the Baconian method could not turn a wheel. At the same time it has no power in itself to furnish them. Before it can start, it has to receive them as an endowment which is not to be questioned. It even goes farther, and makes assumptions peculiar to itself. For example, it postulates that the universe is constructed on principles which harmonize with intelligence. Therefore a single instance is sufficient to con-

vince the scientist that all men must have their heads above their shoulders, while he is conscious of no shock, when in the face of innumerable examples, he discovers that all swans are not white. Therefore also, when a number of hypotheses are suggested, some are in stantly rejected because they imply awkwardness or too great complexity; while another, like the law of gravitation, for exactly opposite reasons is received as highly probable, the moment it flashes upon the mind. Another of these postulates of induction is that matter is both ingenerable and indestructible. It is only upon this principle that chemistry as a science is possible. The water vanishes, and the oxygen and the hydrogen appear. The new substances have scarcely a quality in common with the old. About all we can say of them when compared is that the weight of the one is exactly equal to that of the others. But this only proves that an amount of oxygen and hydrogen has been created which in weight is equal to the amount of water which has been annihilated, unless we assume, as we certainly will. the principle already enunciated. Whence this axiom of chemistry? Not from experience, for before experience can exist in such matters we must have it. In the very nature of the case, it is incapable of verification. It is an ultimate truth which science cannot originate, but which is vital to its being. Judge, in the light which is thus shed, the boastful assertion that science has nothing to do with such truths. Directly, those branches of it which treat of material substances may not be concerned. But without the assumption of these truths, with which the mental sciences are directly concerned, there would be no basis for chemistry or for any other of the branches of human knowiedge which deal with matter.

All attempts to resolve these ideas into other elements, which are gained by experience, are futile. John Stuart Mill undertook to derive them from sensation, through association. But at every step he was compelled surreptitiously to introduce the very ideas for which he was seeking to account. Driven by the exigencies of his theory he was landed in such monstrous conclusions, as, that there may be worlds where two and two make five, and where two straight lines inclose a space. He might just as well have gone farther and taught that in the same worlds black and white are identical. Herbert Spencer has come to the rescue of the same cause, with this new phase of a sensational theory, that these fundamental truths with

which we start are the result of ancestral experiences, beginning, according to his view of evolution, it may be with the ascidian, and accumulating from age to age, until man appears. This theory furnishes its advocates one great advantage above any which its predecessors could afford. It hides all its assumptions behind the comparatively unknown and inscrutable. But in those dim realms where it would conceal its weaknesses, we can see enough to convince that it has nothing upon which to rest. Observe the great leader of this new philosophy as he marches, with what Dr. McCosh has well called "his seven leagued boots," over the great chasm which separates between the unsentient and the sentient. His object is to show how, the nerves being postulated, the purely mental quality called consciousness evolves itself. He assumes that separate impressions are received by what he already calls the senses, and that out of this arises the need of some centre of communication. He says that for this reason "as the external phenomena become greater in number and more complicated in kind and variety and rapidity of the changes to which the common centre of communication is subject must increase there result an unbroken series of these changes - there must arise a consciousness." In other words, the whole question is begged. Consciousness is assumed to be nothing more than an unbroken series of sensations. All that it involves,—the knowledge of one's identity. personality, potentiality,—are declared to arise inevitably out of something which neither possesses them nor anything in common with them. By the side of this, the feat of lifting one's self by their own boot straps would be a trifle. Until the world is furnished with some better explanation of the origin of one ultimate truth, though it may be led astray for a time and in part by such ignes fatui, it will be sure to come back to the conviction that they are strictly primitive in the case of each of us.

III. By the range of the faculties of the human mind. We come in to the world with certain mental powers, and in the exercise of them we intuitively know certain truths. These are the capital on which we can draw. An immense field is open to us, in the shape of mind and matter with those qualities and relations under which we are capable of apprehending them. But here limits exist beyond which science never can press. They have in some cases, the peculiarity of shifting their positions, so that the example which illustrates to-day

may tomorrow be inadequate; but push back these boundaries as we may, at some point they will always exist.

The first Aphorism of Bacon's Novum Organum is that, "Man, as the minister and interpreter of nature, does and understands as much as his observations on the order of nature, either with regard to things or the mind, permit him, and neither knows nor is capable of more." According to this unquestioned principle, the whole of human knowledge must always be a mere drop as compared with the great ocean out of which it is taken, and which, if the powers that we have were sufficiently expanded, would be accessible to us. The time within which observation of the physical universe is possible, or even within which its co-dition may legitimately be inferred by us, is but a moment as to its entire duration. Upon any probable theory of its origin, we soon go back to a period when all its conditions were so different from those with which we are acquainted that we are compelled to confess our utter ignorance. When we look forward a little into the future, we soon arrive at another period where the conditions are again as completely altered, and we are as thoroughly in the dark. The unknown past and the unknown future of the universe of matter, not to speak of that of mind, must be so vast that the whole of the period, which lies between them and within which our knowledge is confined, is a very little thing. As to *space* also, we are equally limited. It divides itself into infinitesimally small portions and each of these is capable of being occupied with matter under such circumstances as to present peculiar phenomena. It is claimed that within the space filled by the point of a needle millions of atoms revolve about each other in orbits as regular as those of the planets and within the millionth part of the twinkling of an eye. No microscope ever can be constructed by which we can observe such substances and phenomena. Thus, we are limited upon this side. It is not improbable, on the other hand, that all of the stars and nebulæ, with which our planetary system is immediately joined, constitute no more than a little island as compared with the entire siderial heavens. telescope ever can be constructed by which we can observe the wider and more remote portions. Beyond these again, space must extend without bounds. 'Thus, we are limited upon that side.

All our knowledge therefore must be confined to a brief period of time and to a narrow region of space. But within this domain we are

shut in by additional restrictions. There is much with which our faculties are incapable of grappling, except in a very slight degree. ably not one of the senses is able to detect more than a small fraction of the qualities which address themselves to it. Of odors, for instance, there are degrees and varieties which the dog or the deer instantly recognizes, but to which our nostrils are utterly insensible. When the vibrations of the elastic medium exceed a certain rate the human ear cannot hear the sound which they produce. It is probable, therefore, that even in what we call the deepest silence, a constant roar louder than that of a thousand oceans is produced by the modes of m tion which enter so largely into the phenomena of the physical world. If we turn from these examples to others drawn from the mental world we meet with, if possible, greater barriers to knowledge. How is the chasm crossed which divides in our natures between the spiritual person and the physical organ? How can we be conscious that the ego of to-day is identical with the ego of last year? What is the rationale of the law of association, upon which all our knowledge of the past is conditioned? What is the state of the soul in profound sleep? No psychology can solve these problems. What is instinct? How far is the mind of a beast the same as that of a man? How far are its facul ties only analogous in their operations to ours? We have no means of acquainting ourselves adequately with what passes in the mind of the dumb creatures about us, and therefore we are incapable of answering these questions. In Christian lands, most people believe, on the authority of the Scriptures, that, besides the created intelligences which are visible to us, there are others. One of Locke's surmises is that there may be innumerable orders of them, rising one above another in the number and degree of their powers. Beyond the few truths revealed in the Bible, what information have we or can we gain concerning them? God is the uncreated and infinite intelligence We do know something of Him, -of His existence, His nature, His attributes, and His works. But what we do not know and cannot know concerning Him must be infinitely more than all we do know of Him.

Before the individual facts, in which all our knowledge as primar ily gained by our faculties consists, are converted into science or are of permanent value to us, they must be generalized, classified, and reduced under laws. Here, again, we are greatly limited, by the range of our powers. Two things render it impracticable, in multitudes of cases, to lay down laws upon which we can rely as universal in their application. One is the impossibility of observing all the facts which the law is supposed to cover. The other is the impossibility of applying a test which so thoroughly excludes all vitiating circumstances that it is perfectly crucial. In the absence of these requisites all that is attainable is a greater or less degree of probability, under which we can never be sure that we shall not stumble upon exceptions, few or many according to circumstances. We seem to have been hasty even in the conclusion that gravitation belongs to all material substances, for, if the undulatory theory of light is correct, all interstellar space must be thoroughly filled with a substance harder than steel, not an atom of which obeys the law of gravitation. In that case gravitation is the exception, and the absence of it, the rule.

When we have legitimately risen from particular instances to generalizations and laws we are able practically to use them only in a limited degree. Logic is bewildered when it has to deal with a considerable number of complex propositions. The higher mathematics can solve only a few of the simplest problems which arise in the real world. It is an easily comprehended law which determines the course in which the earth moves through the heavens; but, because in producing it more than three of the heavenly bodies are at once directly concerned, not even Newton himself could accurately calculate the orbit. All that ever has been accomplished, and all that ever will be, is an approximation. When we seek to apply these generalizations to the future we are still more thoroughly shut in by impassable barriers. We cannot foresee what new collocations of matter may arise, and what new phenomena they may produce. Laws, too, may be brought to bear upon each other in such altered relations that their results may be modified in the most extraordinary ways. Under such circumstances, the nearest future is always shrouded in uncertainty even with reference to the purely material universe.

But if we could generalize with the utmost accuracy, and if we could infallibly apply the laws of nature to all the cases which fall under them, we still would not have approached a solution of the deeper secrets which lie thick as the leaves of the forest, both within us and about us. Light and heat in their operation always involve modes of motion. They are so correlated that under appropriate con-

ditions the one may be exchanged for the other. But these great truths do not lay any foundation upon which we can ascertain what these forces really are. Light is still light, and heat is still heat; each of them affecting our senses in its own peculiar manner, and as to their substances incapable of identification with each other. Again, protoplasm is, so far as examination has gone, present in all living organisms. But this does not reveal to us what is the nature of life, any more than we know what mind is, because it so far as our observation can now go, is always associated with the brain as its organ. Between certain animals in the embryonic state no difference is distinguishable. As they develop they are differentiated into widely separated classes. But to assume, upon these grounds, that there is no generic distinction between them would be to lose sight of the vital question which still remains unanswered. There must be something in the deepest nature of the embryo which causes it to develop in the one case into one kind of an animal, and in another case into quite another sort. Change the conditions as we may, we cannot change the products. The secret of the differentiation has not been touched.

Behind all else remains the mysterious force called will. It seems to be inseparably linked with all intelligence, and therefore operates most widely and mightily. Some hold that all force may be ultimately resolved into will. Be that as it may, our own experience of its use is sufficient to show us that under the limitations of finite intelligence it has an efficiency which cannot be measured. It is capable of working both by means of law, and above it. Infinite will as exerted by God has no limitations. It can work when, where, and as it pleases. Any view of the universe which omits volition is wholly inadequate. But what can science do with this element? It cannot reduce its operations under law sufficiently to enable it to construct a satisfactory science of phenomena such as those of history or political economy, in which human volition largely enters. Least of all can there be anything like a philosophy which covers the divine will. When we say that God cannot do this or do that, unless the act would involve a contradiction or a violation of His own nature, we utter more than we can by any possibility know.

We have now rapidly glanced at some of the prominent features of this great subject. Nothing like a complete survey, except of a very general kind, has been attempted. We have only fixed a corner here, driven a stake there, roughly run a line yonder, about the out skirts of the territory to be occupied. Within these boundaries much of the ground has already been brought under cultivation. It can be made to yield vastly more of its precious fruits. All that man needs to know, he can know. He has not approached within sight of the boundaries, which God in nature has set for his mind. An inexhaustible field remains into which we ought to press with a profound recognition of its magnitude and importance, and with a zeal which will not be cooled or curbed.

The fundamental idea of this paper must not be confounded with any philosophical doctrine of nescience or agnosticism, current in eith er ancient or modern times. We do positively know some things; not merely their phenomena but the properties of the things themselves. In our knowledge we are not limited to objects of which we can have sensations We can also cognize the attributes of purely mental entities. All of our ideas are not derived from experience. We can even know God himself, not wholly but in part. No opportunity remains to discuss these assertions. They are made here simply for the purpose of avoiding misapprehension. The whole design of this paper has been to distinguish between the possible and the impossible; and so to cultivate that spirit of humility which is vital to science, and to direct the search after knowledge into regions where it can succeed. It is intended to breathe the spirit expressed by the father of English psychology. "If by this inquiry into the nature of the understanding I can discover the powers thereof, how far they reach, to what things they are in any degree proportionate, and where they fail us; I suppose that it may be of use to prevail with the busy mind of man to be more cautious in meddling with things exceeding its comprehension; to stop when it is at the utmost extent of its tether; and to sit down in quiet ignorance of those things which upon examination are found to be beyond the reach of our capacities. We should not, then, perhaps, be so forward, out of an affectation of universal knowledge to raise questions and perplex ourselves and others with disputes about things to which our understandings are not suited, and of which we cannot frame in our minds any clear or distinct perceptions, or whereof (as it has, perhaps too often, happened), we have not any notions at all. If we can find out how far the understanding can extend its views, how far it has faculties to attain certainty, and in what cases it can

only judge and guess, we may learn to content ourselves with what is attainable by us in this state." (Locke's Essay on Human Understanding. B. I.. Chap. I., Sec. 4.)

The formal discussion of President Fisher's paper was presented by Dr. A. McTaggart of Earlham.

DISCUSSION. PROF. A. McTAGGART, Ph.D.

In an investigation of this kind we are compelled to acknowledge that we must proceed with considerable uncertainty.

When we say that science has limits we admit the imperfection of our methods of investigation, for a discussion of this subject falls within the province of some kind of science.

It is a quite common impression that science is fruitful of skepticism and irreligion, nor does the impression appear to be altogether groundless. 'Not long since," says J. Hutchinson Sterling, "within the limits of Westminster Abbey—an Abbey, says the Times, which is inseparably connected with the history of England and of the English Church, Prof. Max Muller reminded his audience (it would seem as sympathetic as it was large and distinguished), how by the most widely read journals, daily, weekly, monthly and quarterly, it is being preached that faith is a hallucination or infantine disease, that the day of re igion is over, that the gods have at last been found out and exploded, and there being no knowledge save what comes to us through our senses, we must be content with finite things and strike out from the dictionary of the future such words as infinite, supernatural, divine."

There appears to be much foundation, too, for this widely spreading skepticism in the utterances of some of the most able and zealous devotees of physical science. Prof. Tyndall in his famous address before the British Association says: "Abandoning all disguise, the confession that I feel bound to make before you is, that I prolong the vision backward across the boundary of experimental evidence and discern in that matter which we in our ignorance, and notwithstanding our professed reverence for its Creator, have hitherto covered with opprobrium, the promise and potency of every form and quality of life."

Says Charlton Bastian: "What we call life, then, is regarded as one of the natural results of the growing complexities of our primal nebula. In this are thorough evolutionists quite agreed." And Balfour Stewart remarks that the extreme scientific school maintain that that which always exists is the atom. It is true Prof. Tyndall may not mean, in the portion of his address above quoted, to deny the existence of an intelligent Creator of the atom, but he places Him so far from us that it tends to weaken our faith.

While Philosophy and Religion do have something to charge against physical science, it can not be charged against Religion that it is always or generally opposed to scientific investigation. Prof. Huxley himself says that the great deeds of philosophers are less the fruit of their intellect than of the direction of that intellect by an eminently religious state of mind.

But what is science?

Reason, operating upon observed facts and intuitions, furnishes us with laws, or principles which we may call science. We have science physical and metaphysical. According to Prof. Bowen, physical science deals with matters of fact observable in nature and in the con stitution of man. Metaphysics deals with relations of ideas, abstractions.

Principal Dawson says: "Science is a term of wide application, and may include any of those subjects of human thought in which facts are systematically arranged and referred to definite principles"

All science has a metaphysical basis. In this, most eminent philosophers are agreed. Dr. Whewell has shown that the Natural Sciences proceed upon and imply principles not derived from experience.

Science is knowledge, but not mere knowledge – it is knowledge methodically arranged so as to facilitate further investigation.

Many students of physical science seem to assume almost infall'bility for their methods, whereas, according to Prof. Bowen they must be attended with considerable uncertainty. The objects of physical science, says he, must always be imperfectly known—we never can be sure that our analysis is complete or that our observation has taken in all their outward qualities.

As to future occurrences the field of positive science is yet more limited; the truth of every proposition respecting them depends on

the axiom that the course of nature is uniform and under similar circumstances we may look for similar effects. Now in the first place, we never can be sure that the circumstances are perfectly similar, and secondly the truth of the axiom itself depends wholly on experimental evidence. Here, then, are limits to natural science, imperfection of observation and the uncertainty of uniformity in the course of nature.

Is not the history of the progress of science in accord with these views?

About 350 years ago, Henry Cornelius Agrippa wrote a book styled De Incertudine et Vanitatum Scientiarum, in which is given an account of the mistakes and foolishness of science. Might there not be a similar book written covering the last 350 years? And who shall say that many things, now regarded as facts beyond question, shall not some time be shown to be full of uncertainty and vanity?

Is there any special field of investigation in which science has shown itself limited and unable to proceed to a solution? For two thouand years says Emil Reymond of Berlin, despite all the advances made by natural science, mankind has made no substantial progress towards the understanding of matter and force, any more than toward the understanding of mental activity from its material conditions

Natural science says the same author is the resolution of natural processes into the mechanics of atoms. Some suppose that the world is only a compound of a finite number of atoms which move in accordance with the laws of mechanics. That it is and ever will remain utterly impossible to understand the higher *mental* operations from the mechanics of atoms (supposing them to be known) needs not to be proved.

Astronomical knowledge of a material system I call such a knowledge of all its parts, their respective positions and their motions that their positions and at any given time past or future, may be calculated with the same certainty as we calculate the positions and motions of the heavenly bodies by means of previous absolute accuracy of observation and perfection of theory. In our incapacity to comprehend matter and force, astronomical knowledge of a material system is the completest knowledge we can expect to acquire of it.

In our endeavor to analyze the physical world we start out from the divisibility of matter, the parts being to our eyes something simple and more primitive than the whole. But we in fact make no advance toward an understanding of things since we carry over into the region of the minute and invisible the concepts we obtained in the region of the gross and visible " It seems that this difficulty can never be removed unless the constitution of man be changed. Ever since the days of Democritus and Lucretius there has been a vain striving to understand the nature and properties of atoms.

Again science grapples with the great question, what is life and what is its origin? Sober science will scarcely claim that it has found a solution to these questions. Spencer in his Biology quotes Schelling as saying "Life is the tendency to individuation" and Spencer himself says, in order, I suppose, to make the matter clear, that life is a co-ordination of actions.

According to Charlton Bastian life is regarded by thorough evolu tionists as a natural result of the growing complexity of our primal nebula. Balfour Stewart says: The extreme scientific school main tain that the m de of life of the atom is so extremely simple as to be quite incomprehensible to us. And when these atoms go to form the body of a living being it is assumed that their numerous simple lives acting together, merge into one complete individuality, just as the various molecular currents when under the exciting influence of the great current merge into one magnet; and at death we have results very similar to those which follow the breaking of the magnetizing current. This view is sometimes held with a belief in Deity and sometimes without. In the former case these atoms are at least entitled to be called the sons of God, while in the latter they will take the place of Deity. On the other hand Prof. Tyndall himself says it is by the operation of an insoluble mystery that life is evolved. In opposition to the view that life is evolved from matter Balfour Stewart says that we know that an organized living thing will only spring from a living an tecedent. Principal Dawson says: To place the origin of all things in atoms we should have to account for the myriad determinations of atoms into diverse forms and arrangements as well as their fixed properties; and as has already been observed this is not within the powers of man to know. "Materialism can not account for life." To conclude that mere protoplasm or albumen includes all the powers of life is to take for granted the most important point to be proved and this in the face of the fact that the properties of dead albumen are not those of living albumen." We are acquainted with no properties of

matter from which we may logically conclude that any material object must become intelligent and conscious or that it must become the habitation of an intelligent and conscious being. Since then some of the ablest scientific men themselves acknowledge the impossibility of explaining the origin of life and since science for more than twenty centuries has been unable to make any marked progress in this direction it would seem probable that a solution of this question lies without the province of science.

Whether the human mind can know the Infinite or not has been a much disputed question. Dr. Mansel, author of Limits of Religious Thought, maintains that our conception of the Absolute and Infinite from whatever side we view it, appears encompassed with contradictions. An object of thought exists, as such, in and through its relation to a thinker; while the Absolute as such, is independent of all relation. The conception of the Absolute thus implies at the same time the presence and the absence of the relation by which thought is constituted. It will be noticed that he means by the absolute that which is free from all relation. The same author says in reply to the proposition that we may know the Infinite partially, that we can not know a part of the Infinite; for then we should have to regard the Infinite as a whole made up of parts. If any part is infinite it cannot be distinguished from the whole, and if each part is finite no number of such parts can constitute the Infinite.

The Absolute and Infinite are like the inconceivable and the imperceptible, names indicating not an object of thought or of consciousness at all, but the mere absence of the conditions under which consciousness is possible.

Sir Wm. Hamilton, in his Lectures on Metaphysics, says: "Of the Absolute and Infinite we have no conception at all, the term Absolute expressing that which is finished or complete, the term Infinite, that which can not be terminated or concluded." But both these distinguished men say that we must believe in the Absolute and Infinite, believe that they exist. Believe that what exists? Something of which we have no conception. Certainly this would require a kind and degree of faith which few possess.

They ask of us an impossibility. President Porter says it is not impossible to conceive of an act of faith or belief which does not include the elements of knowledge. Faith or belief may exclude

definite knowledge, reasoned knowledge. but it can not exclude some kind of intellectual apprehension. And Dr. Patton says: "Men believe, yet intellect furnishes the reasons for their faith; and men reason, yet their conclusions are often expressed in the terms of faith."

The conclusions of Dr. Mansel and Sir Wm. Hamilton seem to be due to the peculiar meanings they attach to the terms Absolute and Infinite; they appear to regard them as quantitative rather than qualitative. Dr. Porter says the truly Absolute and Infinite is that which is not dependent on any other being for its existence or its activity. We contend that we can know that the Absolute is and what it is. The Absolute is and can be known as the correlate which must neces sarily be assumed to explain and account for the universe: It is necessary to the mind to assume the Absolute in order to explain the Finite; then the Finite is certainly explained by those relations which it holds to the Absolute. These relations must be real, else our knowledge is a fiction. For if we can not assume the Infinite we can neither define nor reason the Finite. We can not know the Infinite exhaustively or adequately, nor can we even the Finite. the unexhausted Finite must even be as the Infinite. McCosh: "I stand up for the reality of Infinity, but I claim for it a reality simply as an attribute of some existing object. They are in error who conclude they can not know an Infinite God, but they are equally in error who suppose they can reach a perfect knowledge of Him. Dr. Cocker, of Michigan University, maintains that the idea of an Infinite God is revealed to man in the natural and spontaneous development of his intelligence and the existence of a supreme reality corresponding to and represented by this idea is rationally and logically demonstrable, and therefore justly entitled to take rank as part of our legitimate, valid and positive knowledge. God is recognizable by the human reason. It by no means follows because we can not have Infinite thought we can have no clear and definite thought of or concerning the Infinite.

The human mind, under the guidance of necessary laws of thought, is able from facts of the universe to affirm the existence of God and to attain some valid knowledge of his character and will. It will hardly be disputed that some of the Greek philosophers at tained to this knowledge without the aid of revelation. That there are primary and necessary truths or intuitions of the mind philoso-

phers are generally agreed, though not so well agreed as to what they are. Back of these we can not go. Perhaps a being endowed with additional powers of mind might abandon these and behold "things in themselves apart from all relations, though we can have no conception of how this could be.

"What we know is the thing manifesting itself to us, is the thing exercising particular qualities."

The term "things in themselves," I rather think, says Dr. Mc-Cosh, "is unmeaning, but if it has a meaning it is incorrect. I do not believe there is any such thing in existence as a being "in itself" or that man can even so much as imagine it."

We understand the will to be the mental power by which we put forth volitions—by which we decide to do a thing or to leave it undone. By observation we learn that the will depends for its exercise upon the emotions and the emotions generally upon some exercise of the intellect. If we wish a person to pursue some particular course of action, we approach his intellect, we give information, we urge reasons in order to arouse a desire which we hope may result in his putting forth the desired volition. Can we predict with any certainty what the exercise of the will of another will be or of our own? There are some things that we can predict with considerable certainty. A house is set on fire, the occupant is informed of it, a desire is aroused to escape burning, and he wills to speedily leave the house. There is great probability that he will do so, yet there is no uniform law by which he will so act.

I might also predict that he would use his utmost efforts to save his house from the flames, but should his be insured to advantage a different desire might be aroused and a different volition be put forth. His conduct under the circumstances might depend upon a thousand things which I could not know, his motives certainly I could not know. Nor can I predict with any certainty what my own motives will be any conceivable length of time after the present moment. Mankind, as well as woman, is varium et mutabile semper.

Especially then, in the case of the will, do our imperfect knowledge and observation, and the want of a uniform law prevent our predicting the exercise of the will with any certainty. Of course, with our limited powers, it is quite impossible to confidently affirm just what the limits of science are. We can only judge where they lie from what we know of the constitution of the human mind, and

the futile efforts that have been put forth by students of science for ages.

In view of the ignorance into which we are constantly plunged by every addition of knowledge, it becomes Science to be modest and not disdain the high and glorious inspiration of Divine Revelation, which alone reveals to us the immortality of the soul and our relations to God. "Supernaturale igitur, perficit quidem et elevat Naturam non vero illi contrarium esse potest."

On the other hand let not religious teachers "with a lingering, half doubt as to the legitimacy of the spirit of universal inquiry" be too hasty in condemning honest seekers after truth.

The general discussion was continued by Dr. J. C. Ridpath, President Lemuel Moss, and President Burgess. Dr. Ridpath spoke as follows:

A single point in Dr. Fisher's paper seems to me to require a word of comment. The speaker in discussing the relations of mind and organization seemed to proceed upon the hypothesis that according to the doctrines of scientific materialism the former is the result of the latter-that is, that the materialist holds mind to be a mere result of organization; or, to put it more baldly, a phenomenon of matter. I am aware that this is the current notion of the materialistic dogma. Popularly it is believed that the radical leaders of science hold that there are two eternal things -matter and force, and that that group of phenomena which we call by the general name of mind results from the actions and reactions of matter and force; and that therefore mind may be properly considered as a mere attribute of material organization. Until recently, no doubt, this has been a fair statement of the materialistic doctrine; but it is hardly correct any longer to present this view as expressing the most radical doctrine of science. The present theory of materialism seems rather to be, not that there are two eternal things-matter and force, not that mind is a mere lambent flame, playing phenomenally around the glowing disk of organism, but that there are in the universe two kinds of matter, two varieties of protoplasm, the one living, the other dead; the one having in it, in virtue of its own constitution, all the potencies of life, development and thought; the other having in it the potency of nothing. Of these two kinds of matter, thus fundamentally different in constitution, the living protoplasm has in itself the power of growth, expansion, and the perpetuation of its kind. The dead protoplasm has no power at all. I think that this view more truly expresses the extreme of materialism than that ascribed to scientific radicals in Dr. Fisher's paper; and I believe, withal, that an answer to this hypothesis will have to be from a different point of view and will be more difficult to formulate than is the answer to that dogma which makes mind a mere result of organization.

Dr. Moss, Chairman of Committee on nominations, reported as follows:

For officers for 1881:

President, Alex. Martin, Asbury University; Vice President, Joseph Moore, Earlham College; Secretary, John M. Coulter, Wabash College; Treasurer, Allen R. Benton, Butler University.

The report was adopted and the officers elected.

Dr. Ridpath, Chairman of Committee on place of meeting, reported that the Grand and New Denison Hotels each offered free use of commodious rooms and rates at \$2.00 per day. Referred to Executive Committee.

Dr. Ridpath made a motion that the Committee on Publication make up the deficit in the expenses of the Association by apportioning the same among the various colleges represented in the body. Carried.

The expense of the Annual Publication of the Association was, on motion of Dr. Moss, apportioned to the different colleges according to the *pro rata* assessment made for similar purpose last year.

The Committee appointed at last annual meeting to consider the question of the degree of Master of Arts in cursu, reported progress and was continued.

Dr. Stott offered the following resolution:

Resolved, that this Association regards with favor the establishment of a State Statistical Bureau and we hope that the Legislature will make a liberal allowance for carrying forward the work of the Bureau.

A copy of this resolution was ordered to be sent to Prof. Collett, the head of the Bureau.

The thanks of the Association were tendered to Mrs. J. C. New and Prof. Ora Pearson for the excellent music furnished during the session of the body, and to the Trustees of Central Christian Chapel for the use of the Church.

The Association adjourned with the Benediction by President Moss.

A. R. BENTON, PRESIDENT.

JOHN CLARK RIDPATH, SECRETARY.

22











